



**Europäisches  
Patentamt**

**European  
Patent Office**

**Office européen  
des brevets**

#2  
jc997 U.S. PTO  
09/923150



**Bescheinigung**

**Certificate**

**Attestation**

Die angehefteten Unterla-  
gen stimmen mit der  
ursprünglich eingereichten  
Fassung der auf dem näch-  
sten Blatt bezeichneten  
europäischen Patentanmel-  
dung überein.

The attached documents  
are exact copies of the  
European patent application  
described on the following  
page, as originally filed.

Les documents fixés à  
cette attestation sont  
conformes à la version  
initialement déposée de  
la demande de brevet  
européen spécifiée à la  
page suivante.

**Patentanmeldung Nr.    Patent application No.    Demande de brevet n°**

00480079.3

Der Präsident des Europäischen Patentamts;  
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets  
p.o.

**I.L.C. HATTEN-HECKMAN**

DEN HAAG, DEN  
THE HAGUE,  
LA HAYE, LE

01/11/00

**THIS PAGE BLANK (USPTO)**



Europäisches  
Patentamt

European  
Patent Office

Office européen  
des brevets

**Blatt 2 der Bescheinigung  
Sheet 2 of the certificate  
Page 2 de l'attestation**

Anmeldung Nr.:  
Application no.:  
Demande n°: 00480079.3

Anmeldetag:  
Date of filing: 29/08/00  
Date de dépôt:

Anmelder:  
Applicant(s):  
Demandeur(s):  
INTERNATIONAL BUSINESS MACHINES CORPORATION  
Armonk, NY 10504  
UNITED STATES OF AMERICA

Bezeichnung der Erfindung:  
Title of the invention:  
Titre de l'invention:

System and method for locating on a physical document items referenced in another physical document

In Anspruch genommene Priorität(en) / Priority(ies) claimed / Priorité(s) revendiquée(s)

Staat:  
State:  
Pays:

Tag:  
Date:  
Date:

Aktenzeichen:  
File no.  
Numéro de dépôt:

Internationale Patentklassifikation:  
International Patent classification:  
Classification internationale des brevets:

/

Am Anmeldetag benannte Vertragsstaaten:  
Contracting states designated at date of filing: AT/BE/CH/CY/DE/DK/ES/FI/FR/GB/GR/IE/IT/LI/LU/MC/NL/PT/SE/TR  
Etats contractants désignés lors du dépôt:

Bemerkungen:  
Remarks:  
Remarques:

**THIS PAGE BLANK (USPTO)**

# SYSTEM AND METHOD FOR LOCATING ON A PHYSICAL DOCUMENT ITEMS REFERENCED IN ANOTHER PHYSICAL DOCUMENT

## *Field of the invention*

5           The present invention generally relates to interactive hypermedia systems and more particularly to a method and system for locating on a physical document items referenced in another physical document. The present invention discloses a method and system for creating hyperlinks from items (e.g. words, pictures, foot  
10 notes, symbols, icons) on a first physical document to particular points on a second physical document (manuscript or printed document), for activating these hyperlinks simply by touching the first document, and for highlighting by means of a light emitting source, the position of the items on the second document. In a preferred embodiment, the present invention discloses a method and system for highlighting  
15 on a hard-copy map the geographic positions of places referenced in a hard-copy document.

## *Background of the invention*

### **INTERNET**

20           The Internet is a global network of computers and computers networks (the "Net"). The Internet connects computers that use a variety of different operating systems or languages, including UNIX, DOS, Windows, Macintosh, and others. To facilitate and allow the communication among these various systems and languages, the Internet uses a language referred to as TCP/IP ("Transmission Control Protocol/Internet Protocol"). TCP/IP protocol supports three basic  
25 applications on the Internet :

- transmitting and receiving electronic mail,
- logging into remote computers (the "Telnet"), and
- transferring files and programs from one computer to another ("FTP" or "File Transfer Protocol").

### 30 **WORLD WIDE WEB**

          With the increasing size and complexity of the Internet, tools have been developed to help find information on the network, often called navigators or navigation systems. Navigation systems that have been developed include standards such as Archie, Gopher and WAIS. The World Wide Web ("WWW" or "the  
35 Web") is a recent superior navigation system. The Web is :

- an Internet-based navigation system,
- an information distribution and management system for the Internet, and
- a dynamic format for communicating on the Web.

The Web seamlessly, for the use, integrates format of information, including still images, text, audio and video. A user on the Web using a graphical user interface ("GUI", pronounced "gooney") may transparently communicate with different host computers on the system, different system applications (including FTP and Telnet), and different information formats for files and documents including, for example, text, sound and graphics.

## **HYPERMEDIA**

The Web uses hypertext and hypermedia. Hypertext is a subset of hypermedia and refers to computer-based "documents" in which readers move from one place to another in a document, or to another document, in a non-linear manner. To do this, the Web uses a client-server architecture. The Web servers enable the user to access hypertext and hypermedia information through the Web and the user's computer. (The user's computer is referred to as a client computer of the Web Server computers.) The clients send requests to the Web Servers, which react, search and respond. The Web allows client application software to request and receive hypermedia documents (including formatted text, audio, video and graphics) with hypertext link capabilities to other hypermedia documents, from a Web file server.

The Web, then, can be viewed as a collection of document files residing on Web host computers that are interconnected by hyperlinks using networking protocols, forming a virtual "web" that spans the Internet.

## **UNIFORM RESOURCE LOCATORS**

A resource of the Internet is unambiguously identified by a Uniform Resource Locator (URL), which is a pointer to a particular resource at a particular location. A URL specifies the protocol used to access a server (e.g. HTTP, FTP,...), the name of the server, and the location of a file on that server.

## **HYPER TEXT TRANSFER PROTOCOL**

Each Web page that appears on client monitors of the Web may appear as a complex document that integrates, for example, text, images, sounds and animation. Each such page may also contain hyperlinks to other Web documents so that a user at a client computer using a mouse may click on icons and may activate hyperlink jumps to a new page (which is a graphical representation of another document file) on the same or a different Web server.

A Web server is a software program on a Web host computer that answers requests from Web clients, typically over the Internet. All Web servers use a language or protocol to communicate with Web clients which is called Hyper Text Transfer Protocol ("HTTP"). All types of data can be exchanged among Web servers and clients using this protocol, including Hyper Text Markup Language ("HTML"), graphics, sound and video. HTML describes the layout, contents and hyperlinks of the documents and pages. Web clients when browsing :

- convert user specified commands into HTTP GET requests,
- connect to the appropriate Web server to get information, and

- wait for a response. The response from the server can be the requested document or an error message.

After the document or an error message is returned, the connection between the Web client and the Web server is closed.

5 First version of HTTP is a stateless protocol. That is, with HTTP there is no continuous connection between each client and each server. The Web client using HTTP receives a response as HTML data or other data. This description applies to version 1.0 of HTTP protocol, while the new version 1.1 breaks this barrier of stateless protocol by keeping the connection between the server and client alive  
10 under certain conditions.

## BROWSER

After receipt, the Web client formats and presents the data or activates an ancillary application such as a sound player to present the data. To do this, the server or the client determines the various types of data received. The Web Client is  
15 also referred to as the Web Browser, since it in fact browses documents retrieved from the Web Server.

## HARD-COPY DOCUMENTS

Interactive electronic services, video-on-demand, and the World Wide Web are providing access to an increasing offering of movies, shopping information, games, multimedia documents, electronic commerce and many other services.  
20 During the last years, due mainly to the widespread use of personal computers and the universal access of millions of users to the World Wide Web, the "multimedia publishing" has veritably exploded. On one hand, due to the widespread penetration of CD-ROM drives an enormous amount of multimedia titles combining text, images and sounds, are now accessible to owners of personal computers. On another hand,  
25 an incredible amount of hypermedia information is today accessible via the Internet on the World Wide Web.

A major problem in using these multimedia systems is to browse the enormous variety and quantity of information, to discover what is available, and to make a selection among all the possible choices. By example, when surfing on the Web, a conventional method to navigate across many pages of hypertext documents consists of using search tools or invoking bookmarked links to the different required topics. When surfing on video-on-demand services, a conventional method to navigate is to surf on channels. Advertisements on preview channels are  
35 used as entry points to other movies. Users can navigate and make selections from a remote control using hierarchical menus. Obviously, these approaches does not allows a rapid access and browse of the thousands of multimedia documents that are available on the Web or interactive TV.

40 The study of the different information needs shows that there is a common need. For all kind of reasons, people more and more often require to be rapidly and easily informed about their environment. They want to have information about the

resources or services located in the different regions of the world, in rural, industrial or urban areas. This common need has been identified since long ago by all Geographic Information Systems (GIS) providers, cartographic information providers and, more recently, by most of the Internet information providers (e.g., Netscape Local Channel on

***<http://www.netscape.com/local/index.html>***).

These institutions and many other (e.g.: travel agencies, government agencies, local authorities, etc.) today provide geographic and cartographic information in the Web by means of several services. Basically, these services enable the user to access, browse or download many different types of digitized maps covering practically all regions of the world. During the last years, due mainly to the widespread use of the Global Positioning System (GPS) and in-vehicle computerized navigation systems, and to the universal access of millions of users to the World Wide Web, the "digital mapping publishing" has veritably exploded. Due to the widespread penetration of CD-ROM drives an enormous amount of geographic and cartographic titles are now available to owners of personal computers. Because Internet users can access GIS applications from their browsers without purchasing proprietary GIS software, WebGIS has the potential to make Distributed Geographic Information (DGI) available to a very large worldwide audience. Today WebGIS makes possible to add GIS functionality to a wide range of network-based applications in business, government, and education. Due to this rapid evolution, an incredible amount of cartographic content is today accessible via the Internet, particularly the World Wide Web.

Even if electronic digital maps can be accessed and retrieved throughout the Web by any Internet device (e.g., by a Personal Digital Assistant (PDA) or a WAP enabled smart phone), some drawbacks persist. The retrieval, storage and display of high resolution digital maps require a high communication bandwidth, a large memory, and a high graphic resolution. But, the wireless mobile environment, where small, economic, lightweight hand held devices are commonly used (such as cell phones and Personal Digital Assistants), imposes some constraints for transferring, storing, displaying and manipulating in a Web Browser large image files such as high resolution digital maps. Nowadays, practically all wireless devices are small devices, limited in communications speed, storage capacity, display areas and energy consumption.

To overcome these user's interfacing limitations, several technologies are emerging. These technologies are intended to provide Internet service providers, telecommunications carriers, and Internet-based businesses what they need to offer Web content (originally intended to be displayed on PCs and laptops) to users of wireless devices. For example, IBM's WebSphere Transcoding Publisher:

***<http://www-4.ibm.com/software/webserver/transcoding/>***

translates existing information and images on Web sites into a format readable by hand held devices, such as cell phones, games consoles, PDAs or Web browsers installed in cars. The aim of transcoding is, for example, to re-size a map. If a driver requests a street map from his car-based Web browser, the transcoding software



can take a map originally designed for a PC-based browser and can re-size it to fit the screen of the mobile device installed in the car. However, with the today available technology, a paper road map of normal size and resolution cannot be read comfortably after having been digitized, minimized, and displayed on the small screen of a cell phone or even on the screen of a hand-held PDA. Thus, even if transcoding is a good solution to adapt the format of highly textual Web pages, this technique does not solve the problem of displaying, even with the minimum comfort, a digitized version of a full size paper map on a small size and low resolution display of a cell phone.

Apart from the herein described technical and ergonomic limitations, the present invention is based on the recognition of two fundamental facts:

- **1) People are very skilled at browsing through paper catalogs, magazines, newspapers, maps and books by flipping through the pages and glancing at pictures and text.**

Even if the enthusiasm of the public for new computer-based multimedia services has been seen by many analysts as a threat to the conventional forms of hard-copy publishing, particularly book publishing, the experience teaches that reading a book cannot be compared with reading an electronic media. In fact, people are very skilled at browsing through paper catalogs, magazines, newspapers, maps and books by flipping through the pages and glancing at pictures and text. In fact, today, reading paper remains preferable for most people, whether they are familiar with computers or not. Publication entitled "The Last Book", IBM Systems Journal, Vol 36, No. 3 Vol 36, No. 3 - 1997, by J. Jacobson, B. Comiskey, C. Turner, J. Albert, and P. Tsao of the MIT Media Laboratory, clearly illustrates the differences between printed books and computer screens in the following terms:

*"A book represents a fundamentally different entity than a computer screen in that it is a physical embodiment of a large number of simultaneous high-resolution displays. When we turn the page, we do not lose the previous page. Through evolution the brain has developed a highly sophisticated spatial map. Persons familiar with a manual or textbook can find information that they are seeking with high specificity, as evidenced by their ability to remember whether something that was seen only briefly was on the right side or left side of a page, for instance. Furthermore their haptic connection with the brain's spatial map comprises a highly natural and effective interface, when such information is embodied on actual multiple physical pages.*

*Another aspect of embodying information on multiple, simultaneous pages is that of serendipity and comparison. We may leaf through a large volume of text and graphics, inserting a finger bookmark into those areas of greatest interest. Similarly, we may assemble a large body of similar matter in order to view elements in contrast to one another, such as might be done to determine which of a particular set of graphical designs is most satisfying".*

Out of those advantages the most important problem, of course, with traditional printed books is that they cannot be changed, amended, updated nor completed.

5 The same arguments concerning the friendliness and usefulness of hard-copy books are applicable to hard-copy geographic maps. Paper documents and maps have a number of useful properties:

- Paper maps are larger;
- They can be viewed, marked, or manipulated easier and faster;
- They are portable, familiar and easily distributed;

10 Thus, out of the above cited technical restrictions applicable to hand-held portable devices, even if the enthusiasm of the public for computer-based digital mapping can be seen as a threat to the conventional paper documents and maps, the reality is that for many people, on real and practical circumstances, the friendliness, usefulness and availability of paper cannot be reproduced today  
15 with electronic documents. The use of physical documents and maps remains preferable for most people, whether they are skilled or not in using computers.

- **2) Touching directly the objects we have around is one of the simplest, most instinctive, and universal human actions.**

20 Finger pointing and touching are the most natural form of human/machine interface. The action of touching is so simple and natural that navigating by means of touch screens requires no training and no learning. In fact the pervasiveness robustness and versatility of the "touch technology" is transforming the way people are living, working, learning, and playing. The "Touch technology" is successfully used in many different applications, for  
25 example:

- **In industrial environments:** Environmentally-robust touch screens are increasing productivity under hazardous and hostile conditions that would cripple a standard personal computer and keyboard.
- **In hospitals:** Touch input helps doctors to prescribe medications to patients faster by allowing handwritten prescriptions.
- **In retail locations:** Interactive, through-the-window displays let customers shop whenever they want, even when a store is closed.
- **In mobile and consumer devices:** Touch and stylus input is the widely accepted input method for portable, and other mobile devices.

- **At tourist destinations:** User-friendly kiosks are a cost-effective way to help travelers to get information and make their own reservations.

The two main advantages of touching are:

- **Simplicity:** Touching with the fingertip is the simplest and more intuitive form of pointing and selecting an item, and
- **Versatility:** Touching is particularly adapted to applications where the use of a keyboard, a mouse or an optical pencil or stylus is not practical or is not well adapted to the user's service or comfort.

Traditionally, a touch panel is integrated into the computer display. The touch panel and the display forms a combination called "touch screen". The input device is integrated into the monitor, so no space is wasted, and the interaction of the user with the system is made easier. The system guides the user by showing different choices in the form of icons displayed on the screen. When the user touches the icon of its choice, the associated action is executed.

In conclusion, there is a real need to provide a system and method for enriching the static information provided by conventional paper documents, maps and drawings.

There is a need to locate on physical documents, items referenced in another physical documents while accessing through the Web hyperlinked information (mostly textual) related to these items.

More particularly, there is a need, using items printed on a physical document, to create hyperlinks with electronically stored data or with other printed items on the same or on a different physical document.

There is a need to provide mobile users with additional information directly accessible from hard-copy documents and more particularly to illuminate on paper maps, places referenced on hard-copy documents.

There is a need to display information on physical documents while keeping intact the integrity of these physical documents.

None of the methods described in the prior art discloses a method or system that would enable a user to see illuminated, on paper maps, locations of resources or services referenced in a physical document and to access at the same time on the Web information related to these resources and services simply by touching with a fingertip printed items (i.e., words, icons, figures, foot notes, etc.).

### ***Objects of the invention***

It is an object of the present invention to highlight, on a physical (hard-copy) document or physical surface, information related to items selected in another physical document.

5 It is a further object of the present invention to access from a physical document, multimedia information and/or services located in a user workstation or in one or a plurality of servers connected to a communication network.

10 It is a further object of the present invention to enable a user, when browsing a printed document comprising references to locations in the world (e.g., names of towns, oil posts, motels, buildings, hospitals, monuments, etc.), to receive visual indications showing the position of said locations illuminated over a printed map, even if said locations are not represented on said map.

### ***Summary of the invention***

15 The present invention generally relates to interactive hypermedia systems and more particularly to a method and system, for use on a user system, of creating hyperlinks from hyperlinked items referenced in a first physical document to particular points on a second physical document. The present method comprises the steps of:

- 20
- creating an hyperlink table for the first physical document; this first physical document comprising one or a plurality of pages;
  - storing in the hyperlink table an identification of the first physical document;

for each page of the first physical document:

- 25
- storing in the hyperlink table an identification of the page and an identification of hyperlinked items defined on this page;
  - associating to each hyperlinked item referenced in the first physical document, a point on a page of a second physical document;
  - storing in the hyperlink table for each hyperlinked item, absolute coordinates of the associated point;
  - determining the position of points pressed on a first opto-touch foil; the first opto-touch foil being placed and aligned over or under the page of the first physical document; the first opto-touch foil being pressed at points corresponding to the position of the hyperlinked items;
  - storing in the hyperlink table, the position of the points pressed, the hyperlink table comprising for each hyperlinked item, an indication of its position on the
- 30
- 35

The present invention also discloses a method and system, for use on a user system, for activating hyperlinks from hyperlinked items referenced in a first physical document to particular points on a second physical document, said method comprising the steps of:

- 5     • identifying a first physical document;
- identifying a page in this first physical document;
- determining the position of a point pressed on a first opto-touch foil placed and aligned over or under the identified page; said first opto-touch foil being pressed at a point corresponding to a selected hyperlinked item;
- 10    • identifying the selected hyperlinked item referring to an hyperlink table associated with the first physical document, this hyperlink table comprising an indication of the position of each hyperlinked item referenced in the identified page of the first physical document;
- identifying the position on a page of a second physical document of a point associated with the identified selected hyperlinked item referring to the
- 15    hyperlinked table, the hyperlinked table comprising for each hyperlinked item referenced in the first physical document, the position of a point on a page of a second physical document;
- sending to a second opto-touch foil the position of the point associated with the
- 20    selected hyperlinked item on the page of the second physical document, the second opto-touch foil being placed and aligned over or under the page of the second physical document; the second opto-touch foil being used for highlighting the point associated with the selected hyperlinked item.

25     The foregoing, together with other objects, features, and advantages of this invention can be better appreciated with reference to the following specification, claims and drawings.

### ***Brief description of the drawings***

30     The novel and inventive features believed characteristics of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative detailed embodiment when read in conjunction with the accompanying drawings, wherein :

- **Figure 1** shows the main components of the invention.
- 35    • **Figure 2** shows the internal structure of the opto-touch foil.
- **Figure 3** shows an example of transparent touch foil technology.
- **Figure 4** shows an example of transparent light-emitting foil technology.

- **Figure 5** shows the mechanisms of selection, information access and display of hyperlinked items.
- **Figure 6** shows a physical document.
- 5 • **Figure 7** shows a flowchart of the method of creating hyperlinks on physical documents.
- **Figure 8** shows the items of a page of the physical document for which hyperlinks must be created.
- **Figure 9** shows how the opto-touch foil is placed and aligned over the page of the physical document.
- 10 • **Figure 10** shows how the user presses the opto-touch foil on a selected item to create an hyperlink.
- **Figure 11** shows the method of triggering hyperlinks by touching highlighted items from a physical document.
- 15 • **Figure 12** shows how to use the opto-touch foil to enter the document reference number.
- **Figure 13** shows how to use the opto-touch foil to enter a page number and how selected items are illuminated.
- **Figure 14** shows how the user presses the opto-touch foil on illuminated items.
- 20 • **Figure 15** shows how the information related to the item selected by pressing the opto-touch foil placed over or under the document is displayed.
- **Figure 16** shows a physical map and a physical document referencing locations on this map.
- **Figure 17** shows how a physical map is calibrated.
- 25 • **Figure 18** shows how the locations corresponding to highlighted items on the page of the physical document are illuminated by means of the opto-touch foil placed over the map.
- **Figure 19** shows how to identify an highlighted location on the map.
- 30 • **Figure 20** shows how the user, by pressing on a location on a map or on a physical document, can retrieve from the Web information or service associated with said location.

- **Figure 21** shows a particular embodiment of the present invention and more particularly a method for locating in a physical document items referenced in this physical document.
- **Figure 22** shows how to identify the location of a restaurant on a paper map of a city simply by pressing on the name of this restaurant in the "Yellow Pages" of this city.
- **Figure 23** shows how to call a restaurant by phone simply by pressing on the phone number of this restaurant in the "Yellow Pages".
- **Figure 24** shows how to locate different restaurants on a paper map of a city simply by pressing on the address of these restaurants in the "Yellow Pages" of this city.

### ***Preferred embodiment of the invention***

The invention provides a system and a method for locating on a physical document items referenced in the same or in a different physical document and optionally for accessing multimedia information and/or services located in a user workstation or in one or a plurality of servers connected to a communication network. More particularly, the invention discloses a system and method for highlighting on a paper map the geographic location of one or a plurality of places cited or referenced in a physical document.

In a particular embodiment, the invention relates to the creation in a first physical document of hyperlinks from printed items (e.g. words, pictures, foot notes, symbols, icons) to other items or particular points on a second physical document. More particularly, the invention provides a system and method for assigning geographic coordinates (absolute coordinates) to items (for example places like towns, oil posts, motels, public buildings, water springs, historic monuments, factories, etc.) cited or referenced in said first physical document (for example cited in a hard-copied travel guide). The activation of "geographic links" associated with a particular printed item on the first physical document, for example a directory of hotels, results in highlighting the position of this item on the second physical document, for example a paper map.

In a particular embodiment, the system comprises two transparent opto-touch foils placed aligned respectively on the first physical document and on the second physical document preferably a geographic map. Both opto-touch foils are connected to a user workstation. The second opto-touch foil generates optical signals highlighting the locations, on the geographic map, of all places referenced in the first physical document. The system comprises means for computing the coordinates on the second opto-touch foil of the locations related to the items referenced in the first physical document and for highlighting these locations on the geographic map by luminous signals.

## **SYSTEM FOR HIGHLIGHTING POSITIONS OF ITEMS ON PHYSICAL DOCUMENTS**

As shown in Figure 5, the system according to the present invention comprises :

- 5     • a first opto-touch foil (507), preferably transparent, placed by the user over (or under) a first physical document (509), or a portion of this first document. This first opto-touch foil is used to illuminate and highlight hyperlinked items (506) over the surface of said first physical document, and to read coordinates of these hyperlinked items.
- 10    • a user workstation (500) for accessing the information and/or the service associated with the hyperlinked items (506).
- a second opto-touch foil (512) (or even the same first opto-touch foil) preferably transparent, placed by the user over (or under) a second physical document (511), or a portion of said second document. This second opto-touch foil is used
- 15    to illuminate and highlight on a second physical document (511) items or points (513) related to items selected by the user on said first physical document (506).

### **Physical Documents**

Physical documents (509), (511) can be of any kind, for example geographic maps (e.g., topographical maps, political maps, historical maps, route maps, shaded relief maps, city maps, natural resources maps, rail road maps or even any other type of map), novel books, text books, technical plans, commercial catalogs or even any other type of hard-copy, engraved, written, or printed surfaces (e.g., paintings in a museum of art). The material of the physical documents can be paper, plastic, wood or any other material.

### **Opto-Touch Foils**

In a preferred embodiment opto-touch foils (507), (104) comprise two, functionally independent transparent foils, namely:

- a touch foil, and
- a light emitting foil (opto foil).

30       Figure 2 shows the cross section of an opto-touch foil (200) comprising:

- a transparent resistive or capacitive touch foil (201), of the type used commonly to manufacture touch screens. The generated signals are generally proportional to the coordinates of the point that is pressed or touched (203),
- 35    • a transparent light emitting foil (202), which is a transparent, bright, self-emitting display that can emit light (204) from either one or both surfaces.

The combination of both foils (i.e., the touch foil stacked over the light emitting foil) forms an opto-touch foil (200). Figure 2 represents an opto-touch foil placed and aligned over a physical document (205) comprising a plurality of items



(206) (i.e., words, pictures, icons, etc.) printed (or written, painted, engraved ...) on its surface.

### **Touch Foil Technology**

The touch foil component (201) may be made of transparent resistive or capacitive films of the type used commonly to manufacture touch screens. The generated signal is generally proportional to the coordinates of the point pressed. One example of touch foil technology it would be possible to use, is the TouchTek4 (4-wire Analog Resistive Touchscreens) of MICRO TOUCH company (TouchTek™ is a trademark of the MICRO TOUCH Company). The TouchTek4 technology is fully described in the Web site of MICRO TOUCH Company at <http://www.microtouch.com/>.

As illustrated in Figure 3, TouchTek4 touch screens (310) use a polyester sheet (301) with a conductive coating (302) as a vertical conductive electrode, providing one-half of a touch coordinate. The topsheet (300) is separated from the bottom layer, a glass substrate (304) with a conductive coating (303), by spacer dots (305). The bottom sheet (306) is attached to the topsheet (300) by means of an adhesive (309). The bottom sheet (306) forms the horizontal conductive electrode, generating the second half of the touch coordinate. Silver bussbars located on the topsheet (307) and on the bottom sheet (308) pass the touch coordinates to the touchscreen controller. TouchTek4 touchscreens feature hard-coated polyester topsheets (300), available in several surface finishes. Spacer dots (305) are available in several dot arrays, optimized for finger, pen and finger, or pen-only input. The conductively-coated glass bottom sheet (303, 304) is available in several thicknesses. Electronic control is provided by a serial controller, or by 4-wire controllers. TouchTek4's specifications include narrow inactive border areas and compact touch sensors which allow system designers and OEMs to provide the largest useable screen area and full mouse emulation without sacrificing functionality or consuming excess power. Apart from being suited for implementing the touch foil functions of this invention, TouchTek4 touchscreens are commonly used in hand-held personal information management systems, PDAs, mobile computing systems, automotive, diagnostics and telecom devices, and Internet appliances. TouchTek4 touchscreens are engineered to accept more than three million touches to any area of the screen.

### **Light Emitting Foil (Opto-foil)**

The light emitting foil may be made of an array of TOLED's (Transparent Organic Light Emitting Devices), of the type used today to create vision area displays on windshields, cockpits, helmets and eyeglasses. TOLED displays, which can be up to 85% transparent when not energized are today manufactured with standard silicon semiconductors. One example of light emitting foil technology it would be possible to use is the technology used for the TOLEDs manufactured by UNIVERSAL DISPLAY CORPORATION. The TOLED technology is fully described in the Web site of UNIVERSAL DISPLAY CORPORATION at <http://www.universaldisplay.com/toled.html>.

As illustrated in Figure 4, in its most basic form, a TOLED is a monolithic, solid-state device consisting of a series of "small molecule" organic thin films sandwiched between two transparent, conductive layers. As a result, TOLEDs are bright, self-emitting displays that can be directed to emit from either or both surfaces. This is possible because, in addition to having transparent contacts, the organic materials are also transparent over their own emission spectrum and throughout most of the visible spectrum. Typically, a transparent conductive material (402), e.g., indium tin oxide (ITO), for hole-injection is deposited directly onto a glass substrate (401). Then, a series of organic materials are deposited by vacuum sublimation on the ITO layer: The first organic layer (403) serves as a hole-transporting layer (HTL) and the second layer (404) serves as both a light-emitting (EL) and electron-transporting layer (ETL). Finally, a transparent top contact (405) is deposited for electron injection on top of the organic films. When a voltage (406) is applied across the device, it emits light. This light emission is based upon a luminescence phenomenon wherein electrons and holes are injected and migrate from the contacts toward the organic heterojunction under the applied electric field. When these carriers meet, they form excitons (electron-hole pairs) that recombine radiatively to emit light.

Since TOLEDs are thin-film, solid-state devices, they are very thin, lightweight and durable, ideal for portable applications, like the one disclosed in this invention. TOLEDs can be bottom, top, or both bottom and top emitting. Also, TOLEDs technology has attractive advantages regarding, transparency (TOLED displays can be nearly as clear as the glass or substrate they're on and when built between glass plates, TOLEDs are > 80% transparent when turned off), energy efficiency (for longer battery life), full viewing angle, bright and high contrast light emission, fast response time, and environmental robustness. Thus, TOLEDs are well suited for manufacturing the light emitting foil component used jointly with the touch foil according to the present of this invention.

### User Workstation

The user workstation (103), (500) can be an Internet enabled cell phone (e.g., the NOKIA 7110 or the 9110i Communicator), a PDA, a TV monitor, a game console, an onboard computer, a network computer, an Internet appliance or any wireless IP enabled device, connected to the opto-touch foils (102) and (104). The user workstation is used for receiving from one opto-touch foil (102), (104) the coordinates of points pressed over the physical documents (101), (105) and for sending to these opto-touch foils (102), (104) the coordinates of the points to be highlighted. Opto-touch foils may communicate with the user workstation by means of a cable, a wire pair, an infrared link, or a wireless radio link.

In a particular embodiment of the invention, the user workstation (103) is used to access information and/or services stored locally or located on one or a plurality of servers (108) connected to the network (109). Preferably, the user workstation (500) is connected to the Internet network (501) and comprises a Web Browser application (503). Servers (505) are Web servers and the information

or/and the service are Web pages hyperlinked to selected items (506) printed or engraved on the first physical document (509). An hyperlink is activated by pressing:

- either the first opto-touch foil placed over/under the first physical document (509) at the point corresponding to the selected hyperlinked item (506). The location (513) associated with the hyperlinked item selected by the user is illuminated by means of the second opto-touch foil (512) placed over or under the second physical document (511).
- or, the second opto-touch foil placed over/under the second physical document at the point corresponding to the location associated with the selected hyperlinked item. The selected hyperlinked item is illuminated by means of the first opto-touch foil placed over or under the first physical document (511).

### Information and/or Service Access

When the user wants to select a particular portion of a physical document (102) (a page of a book for example), he places over (or under) this portion, a first opto-touch foil (101) and enters in the workstation the reference of this portion (the page number for example). In a preferred embodiment, the page number can be entered simply by touching some buttons marked on the top (or bottom) of the opto-touch foil (101). The page number may be also entered directly by means of the keyboard, the mouse or the touch screen of the user workstation or by any other means such as a bar code reader ...

In a preferred embodiment, hyperlinked items (items that can be selected to be highlighted on a second physical document, preferably a map, or that can be used to access information on a server) on this page (106), are automatically illuminated and highlighted by the light emitting foil (101) placed on the surface of this page. This light emitting foil operates under the control of the user workstation (103). This illumination and highlighting allows the localization and identification of all hyperlinked items on the page selected by the user.

In order to highlight on a map the location of an hyperlinked item or to access a multimedia service associated with this hyperlinked item (102), the user touches with its finger or exercises a pressure on the portion of the opto-touch foil (101) placed over the hyperlink item he wishes to select (107).

The position of the hyperlinked item selected on the opto-touch foil is used to determine the position of this item on a second opto-touch foil (104) placed over (or under) a page of a second physical document (105), preferably a map. In a preferred embodiment, the position of the item selected in the first document is automatically highlighted (107) on this second physical document (105) by means a luminous signal (or light spot) generated by the second opto-touch foil (104). The second opto-touch foil is under control of the user workstation (103).

The position of the hyperlinked item selected on the opto-touch foil is also used to identify and locate the server (108) and the information within this server the

user wants to access. The user workstation (103) then accesses the identified server and retrieves and displays the information or/and service associated with the selected illuminated item. In the particular embodiment of the invention shown in Figure 5, the user workstation (500) is connected to the Internet network (501). The user workstation comprises a user interface (502) including a Web Browser (503) (also called "Web Client") to access the World-Wide-Web (WWW). In order to access the Web pages associated with an illuminated hyperlinked item (506) on a physical document (509), the user touches with its finger the opto-touch foil (507) over the illuminated item (508) he wishes to select. The position of the illuminated item selected on the opto-touch foil identifies the Web server (505) and the Web pages the user wants to retrieve and display. The Web Browser program (503) sends a HTTP request (504) to the identified Web Server (505). The response to the request (HTTP response) is sent by the Web Server (505) in the reverse direction to the Web Browser (503). The HTTP response comprises the requested Web pages associated with the selected illuminated item.

#### **METHOD FOR CREATING HYPERLINKS ON A PHYSICAL DOCUMENT**

In general terms, the method of creating hyperlinks from items (506) on a first physical document (509) to particular points (513) on a second physical document (511), comprises the steps of:

- creating an hyperlink table (510) for the first physical document (509); said first physical document comprising one or a plurality of pages;
- receiving and storing in said hyperlink table (510) an identification of the first physical document (509);

for each page of said first physical document (509):

- receiving and storing in said hyperlink table (510) an identification of the page and an identification of hyperlinked items (506) defined on said page;
- associating to each hyperlinked item (506) referenced in the first physical document (509), a point on a page of a second physical document (511);
- storing (703) in said hyperlink table (510) for each hyperlinked item (513), absolute coordinates of the associated point. The absolute coordinates are preferably the geographic coordinates of the associated point represented in the second physical document (longitude/latitude of the location) if this document is a map;
- determining the position of points pressed on an opto-touch foil (507); the opto-touch foil being placed and aligned over or under the page of the first physical document (509); said opto-touch foil being pressed at points corresponding to the position of said defined hyperlinked items (506);
- storing the position of the points pressed in the hyperlink table (510), said hyperlink table comprising for each hyperlinked item, an indication of its position on the page of the first physical document.

The method comprises the further steps of:

- computing from the absolute coordinates, foil coordinates corresponding to the position on a second opto-touch (512) foil placed and aligned over or under the second physical document (511), of each point associated with an hyperlinked item (506);
- storing the foil coordinates in the hyperlink table (510).

In a particular embodiment, the present method comprises a further step for creating hyperlinks from items (506) on the first physical document (509) to information or services located on the user system (500) or on one or a plurality of servers (505). This further step consists of:

- receiving and storing in said hyperlink table (510) an identification and a location of information or service associated with each defined hyperlinked item.

The method for creating hyperlinks from a first physical document (hand written or printed document like the document shown in Figure 6 entitled "*Travel Guide to the Balkans*"), to a second document (preferably a paper map) and to highlight the positions of referenced locations on this second document, is shown in Figure 7. This method comprises the steps of:

- (701) assigning a reference number (identifier) to the physical document;

and for each page of the first physical document document (or portion of the document):

- (702) selecting items on the page;
- (703) creating hyperlinks between these selected items and particular points on the second physical document using an hyperlink table;
- (704) placing and aligning an opto-touch foil over the page;
- (705) pressing the opto-touch foil over the selected items;
- (706) reading and storing in an hyperlink table the position (foil coordinates) on the opto-touch foil of the selected items on this page.

In a particular embodiment, the method comprises the further step of :

- (703) creating hyperlinks between the selected items and information or services located on the user system or on one or a plurality of servers.

#### **(701) Assigning a Reference Number to the Document**

As shown in Figure 6, for each document he receives, the user:

- assigns a reference number to this document (e.g., 387) for identifying said document.
- writes this reference number on the document, and

- creates an hyperlink table associated with the document and accessible from the user workstation, said hyperlink table comprising the reference number of the document and other relevant information related to the document such as title, author, ISBN (International Standard Book Number), date, etc... The hyperlink table may be stored within the user workstation or may be stored in an external memory accessible from the user workstation.

The header of the new created hyperlink table associated with the document shown in Figure 6, can be built as follows:

Doc: 0387		Title: "Travel Guide to the Balkans"	Author: Bosiljko Vasilj Medjugorje, Bosnia & Herzegovina Phone: (387-88) 650-055	
		Date: 28 / 01 / 2000	ISBN: 84-344-0856-2	
Calib. Location:		URL:	Map Scale:	Foil Resolut.

#### (702) Selecting Items on Pages of the Document and (703) Creating Hyperlinks

As shown in Figure 8, each time the user wants to create hyperlinks for items (801) located on a page of a first physical document, he:

- enters the page number (802) where the items are referenced in the hyperlink table of the first physical document (e.g., 16);
- associates with each item on this page, the absolute coordinates associated with the location of the item on the second physical document. If the second physical document is a geographic map and if the item refers to a location, the user enters the geographic coordinates (longitude / latitude) of this location.

In a particular embodiment, the present method comprises further steps for creating hyperlinks from an item (506) on the first physical document (509) to information or services located on the user system (500) or on one or a plurality of servers (505). In this case, the user:

- associates with each item on this page a destination address within the communication network, this destination address identifying a server connected to the communication network and the information and/or services within this server the user wants to access;
- enters the destination address associated with this item (e.g., an URL address for example) in the hyperlink table.

In a preferred embodiment, the hyperlink table associated with the page shown in Figure 8, appears as follows:

Doc: 0387		Title: "Travel Guide to the Balkans"	Author: Bosiljko Vasilj Medjugorje, Bosnia & Herzegovina Phone: (387-88) 650-055	
		Date: 28 / 01/ 2000	ISBN: 84-344-0856-2	
Calib. Location:		URL:	Map Scale:	Foil Resolut.
Pg: 16				
LOCATION	FOIL 1 X/Y	HYPERLINK	LAT / LONG	FOIL 2 X/Y
Zagreb		<a href="http://www.interconti.com/croatia/zagreb/hotel_zagic.html">http://www.interconti.com/croatia/zagreb/hotel_zagic.html</a>	N 045° 36' 04" E 016° 12' 20"	
Karlovak		<a href="http://www.hr/hrvatska/HRgradovi/Karlovac/uvod-en.htm">http://www.hr/hrvatska/HRgradovi/Karlovac/uvod-en.htm</a>	N 045° 28' 17" E 015° 43' 35"	
Knin		<a href="http://www.sibenik-knin.com/">http://www.sibenik-knin.com/</a>	N 044° 03' 21" E 016° 15' 26"	
Hotel Bellevue		<a href="http://www.tel.hr/np-plitvice/smje/bellevue.htm">http://www.tel.hr/np-plitvice/smje/bellevue.htm</a>	N 044° 18' 46" E 015° 45' 06"	
Slunj		<a href="http://mx1.xoom.com/slunj/">http://mx1.xoom.com/slunj/</a>	N 045° 13' 53" E 015° 40' 18"	
Plitvice			N 044° 52' 38" E 015° 44' 37"	
Udbina		<a href="http://www.aiha.com/english/partners/biozad/zdkn.htm">http://www.aiha.com/english/partners/biozad/zdkn.htm</a>	N 044° 31' 19" E 015° 45' 22"	
Gracac		<a href="http://www.crotours.com/English/Beauties/Parks/velebit.htm">http://www.crotours.com/English/Beauties/Parks/velebit.htm</a>	N 044° 21' 07" E 015° 48' 36"	

The information or service associated with the hyperlinked item may be stored locally in the user workstation. In this case, an identification within the user workstation of the information or service (local address, file name, exec name ...) is entered in the hyperlink table.

#### (704) Placing and Aligning the Opto-touch Foil over a Page of the Document

As shown in Figure 9, after the hyperlinked items of a page have been defined in the hyperlink table associated with the document, the opto-touch foil is:

- placed over (or under) the page, and
- aligned with the borders of this page by some conventional means (e.g., by adjusting the upper left corner of the opto-touch foil with the upper left corner of the page).

#### (705) Pressing the opto-touch foil over the selected items and (706) reading the foil coordinates

As shown in Figure 10, for each item previously selected on the page ("Zagreb", "Knin", "Hotel Bellevue", "Slunj", "Plitvice", "Udvina", "Gracac"), the user presses (e.g., by the finger tip) the opto-touch foil on the corresponding item to determine the position (for instance, the coordinates of the item on the opto-touch foil) of this item on the page.

Once the measure of the foil coordinates of each selected item (hyperlinked item) on the page is completed, the hyperlink table is updated as follows:

Doc: 0387		Title: "Travel Guide to the Balkans"	Author: Bosiljko Vasilj Medjugorje, Bosnia & Herzegovina Phone: (387-88) 650-055	
		Date: 28 / 01/ 2000	ISBN: 84-344-0856-2	
Calib. Location:		URL:	Map Scale:	Foil Resolut.
Pg: 16				
LOCATION	FOIL 1 X/Y	HYPERLINK	LAT / LONG	FOIL 2 X/Y
Zagreb	125 110	<a href="http://www.interconti.com/croatia/zagreb/hotel_zagic.html">http://www.interconti.com/croatia/zagreb/hotel_zagic.html</a>	N 045° 36' 04" E 016° 12' 20"	
Karlovak	170 110	<a href="http://www.hr/hrvatska/HRgradovi/Karlovac/uvod-en.htm">http://www.hr/hrvatska/HRgradovi/Karlovac/uvod-en.htm</a>	N 045° 28' 17" E 015° 43' 35"	
Knin	190 110	<a href="http://www.sibenik-knin.com/">http://www.sibenik-knin.com/</a>	N 044° 03' 21" E 016° 15' 26"	
Hotel Bellevue	35 155	<a href="http://www.tel.hr/np-plitvice/smje/bellevue.htm">http://www.tel.hr/np-plitvice/smje/bellevue.htm</a>	N 044° 18' 46" E 015° 45' 06"	
Slunj	145 180	<a href="http://mx1.xoom.com/slunj/">http://mx1.xoom.com/slunj/</a>	N 045° 13' 53" E 015° 40' 18"	
Plitvice	170 180		N 044° 52' 38" E 015° 44' 37"	
Udbina	195 180	<a href="http://www.aiha.com/english/partners/biozad/zdkn.htm">http://www.aiha.com/english/partners/biozad/zdkn.htm</a>	N 044° 31' 19" E 015° 45' 22"	
Gracac	215 180	<a href="http://www.crotours.com/English/Beauties/Parks/velebit.htm">http://www.crotours.com/English/Beauties/Parks/velebit.htm</a>	N 044° 21' 07" E 015° 48' 36"	

For example, on page 16 of document 387 entitled "*Travel Guide to the Balkans*" written by "*Bosiljko Vasilj Medjugorje, Bosnia & Herzegovina, Phone: (387-88) 650-055*", the foil coordinates of the hyperlinked item "*Slunj*" on the document are X=145 / Y=180. This hyperlinked word "*Slunj*" points to the URL address: <http://mx1.xoom.com/slunj/>. This item also points to a location, named "*Slunj*" with absolute coordinates (geographic coordinates) N 045° 13' 53" (latitude) and E 015° 40' 18" (longitude).

Using the herein described method for the different pages of a same document, the hyperlink table of the complete document is built.

Several types of multimedia services can be defined in the hyperlink table using different types of codes to identify service names and service addresses (e.g., <http://> address to access an URL address on the Internet; [Phone://](tel://) address to make a phone call, etc.). All these multimedia services can be accessed and retrieved from the Web simply by touching the opto-touch foil over the corresponding items highlighted on the hard-copy document.

### METHOD FOR ACTIVATING HYPERLINKS FROM A PHYSICAL DOCUMENT

The user receives a hand written or printed document, like the document entitled "*Travel Guide to the Balkans*", (Doc: 387) shown in Figure 6. Hyperlinks have been previously defined from items selected on pages. As shown in Figure 11, the method of locating, visualizing and highlighting hyperlinked items, of activating hyperlinks and of accessing information and/or services directly from these hyperlinked items highlighted on the pages of a physical document comprises the steps of:



- (1101) selecting a physical document by entering the reference number of this document;
- (1102) selecting a page of this physical document;
- 5   • (1103) identifying for the selected page the position of predefined hyperlinked items referring to an hyperlink table associated with the selected physical document, said hyperlink table comprising for each page of the physical document, a list of hyperlinked items, and for each hyperlinked item, an indication of the position on an opto-touch foil;
- 10   • (1105) placing and aligning the opto-touch foil over (or under) the selected page;
- (1106) selecting an hyperlinked item on this page by pressing the opto-touch foil on the point (light spot) corresponding to the item;
- (1107) determining the position of the point pressed on the opto-touch foil;
- (1108) identifying the selected hyperlinked item referring to the hyperlink table, this hyperlink table comprising an indication of the position of each hyperlinked item on the selected page of the document;
- 15   • (1109) identifying the information or/and the service associated with the selected illuminated item referring to the hyperlink table, this hyperlink table comprising for each illuminated item of the selected page the identification of the requested information and/or service within the user workstation or within the network (preferably by means of a destination address);
- 20   • (1110) accessing the information and/or service;
- (1111) retrieving and displaying this information and/or service on the user workstation.

25       In a particular embodiment, the method of activating hyperlinks comprises the further step of :

- (1104) illuminating (or visualizing, or highlighting) the position corresponding to each of said predefined hyperlinked item by means of the opto-touch foil connected to the user workstation;

#### 30   **(1101) Entering the Reference Number of the Document**

By means of any user interface (keyboard, mouse, touch screen, ...) or any reading means (bar code reader ...), the user enters the reference number (identifier) of the document (e.g.: document 387) he wants to select. In the particular embodiment shown in Figure 12, the user enters the reference number of the document (e.g.: **Doc: 387**) by means of an array of pressure sensible "touch buttons" printed on the top of the opto-touch foil. The user presses in the following order:

- a touch button marked "**Doc**", and then
- numerical touch buttons corresponding to each digit of the document reference number (e.g., "**3**", "**8**" and "**7**").

This procedure gives access to the hyperlink table associated with this selected document.

### **(1102) Selecting a Page and Highlighting Hyperlinks on this Page**

By means of any user interface (keyboard, mouse, touch screen ...) or any reading means (bar code reader ...), the user enters the page of the document (or the portion of the document) (e.g.: page 16) he wants to select. In the particular embodiment shown in Figure 13, by means of the array of pressure sensible touch buttons printed on the top of the opto-touch foil, the user enters the page number to select (e.g.: **Pg. 16**). The opto-touch foil can be on any position (normally the opto-touch foil is placed over the page comprising the hyperlink to trigger). The user presses in the following order:

- a touch button marked as "**Pg**", and then
- numerical touch buttons corresponding to each digit of the page number (e.g., "**1**" and "**6**" ) to select.

This procedure gives access to the selected page (e.g., **Pg. 16**) within the hyperlink table associated with the selected document (e.g., **Doc: 387**).

### **(1103) Identifying the Position of Predefined Hyperlinked Items referring to the Hyperlink Table**

The position (coordinates X and Y) of all the hyperlinked items previously defined for the page selected by the user are retrieved from the hyperlink table and sent by the user workstation to the opto-touch foil.

### **(1104) Illuminating the Position Corresponding to each of said Predefined Hyperlinked Item**

The opto-touch foil receives the information sent by the user workstation. This information comprises the position (coordinates X and Y) of each hyperlinked item defined on the selected page. The opto-touch foil decodes this information and visualize (highlights or illumines) the position of each of the hyperlinked items.

### **(1105) Placing and Aligning the Opto-touch Foil over the selected Page of the Document**

Once a document and a page have been selected, the opto-touch foil generates one or a plurality of light spots signaling that one or more hyperlinks have been defined for this page. Then, the opto-touch foil is:

- placed over (or under) the page, and
- aligned with the borders of the selected page by some conventional means (e.g., by adjusting the upper left corner of the touch foil with the upper left corner of the page).

As shown also on Figure 13, the opto-touch foil is placed and aligned over the selected page. The position of the light spots emitted by the opto-touch foil

corresponds to the position of the hyperlinked items defined for this page. The hyperlinked items appear through the transparent opto-touch foil and are identified by the user thanks to the light spots emitted by the opto-touch foil.

#### (1106) Selecting an Illuminated Item on this Page

As shown in Figure 14, the user selects an (hyperlinked) item ("*Hotel Bellevue*") on the page by pressing (e.g., by means of his fingertip) the opto-touch foil on the illuminated point corresponding to the selected item.

#### (1107) Determining the Position on the Page of the Point Pressed on the Opto-touch Foil

The opto-touch foil sends a signal to the user workstation to identify the selected item. This signal indicates the position on the page of the point that has been pressed by the user on the opto-touch foil. The generated signal is generally proportional to the coordinates (X/Y) of the point that has been pressed.

In our example, the opto-touch foil measures the position on the page of the point that has been pressed (near the light spot over the word "*Hotel Bellevue*") by the user. The coordinates that are measured at this point are around X=35 and Y=155.

#### (1108) Identifying the Selected Item

The illuminated item selected on the opto-touch foil by the user is identified thanks to the hyperlink table. The hyperlink table comprises an indication of the position (coordinates X and Y) of each illuminated item on each page of the document.

In our example, the coordinates measured by the opto-touch foil are around (close to) X=35 and Y=155. They corresponds in the hyperlink table to the hyperlinked item "*Hotel Bellevue*".

The hyperlink table is either stored locally in the user workstation, or is retrieved from a remote server and then stored locally in the user workstation or is stored in a remote server and is accessed remotely .

#### (1109) Identifying the Information Associated with the Selected Item

The hyperlink table comprises for each hyperlinked (illuminated) item of each page of the document the location within the network of the requested information and/or service. The information and/or service may be located by means of a destination address. In the Internet network, Web pages in Web Servers are identified by an URL (Uniform resource Locator).

In our example, the hyperlink table associates the illuminated item "*Hotel Bellevue*" with the URL : <http://www.tel.hr/np-plitvice/smje/bellevue.htm>.

#### (1110) Accessing the Information and/or Service

The user workstation Web triggers the hyperlink (destination address, URL, ...) associated in the hyperlink table, with the identified selected item.

In our example, the hyperlink labeled "*Hotel Bellevue*" is triggered since the system determines from the hyperlink table that, for this page (i.e., Pg. 16), X=35, Y=155 are the coordinates of the nearest hyperlink to the sensed position. Thus, in

this example, a simple pressure near the illuminated item "*Hotel Bellevue*" will automatically trigger the following hyperlink on the Web:

***<http://www.tel.hr/np-plitvice/snje/bellevue.htm>***.

#### **(1111) Retrieving and Displaying the requested Information and/or Service**

The information contained at the selected destination address (URL) can be displayed on the user workstation. As shown in Figure 15, additional information (e.g., document number, page number, hyperlinked item, foil coordinates and URL) related to the hyperlinked (illuminated) item selected by the user can be shown on the Web Browser along with the information retrieved from the Web Server.

#### **METHOD FOR HIGHLIGHTING ON A SECOND PHYSICAL DOCUMENT LOCATIONS REFERENCED IN A FIRST PHYSICAL DOCUMENT**

In general terms, the illumination of locations related to items referenced in a first physical document (509), on a paper map (more generally on a second physical document) (511) can be described as follows. First, the user selects a paper map (511) covering the geographic area of the locations the user wants to highlight. The user places and aligns this paper map under an opto-touch foil (512). He enters the map scale in his workstation (500). To calibrate the opto-touch foil (512), the user selects on his workstation the "geographic link" of a particular location (calibration location) (514) represented on the paper map (511). The opto-touch foil (512) is calibrated by pressing the opto-touch foil on said particular location (514). As soon as this operation is executed, the location of each item (506) in the first physical document (509) for which an hyperlink ("geographic link") is defined, is automatically highlighted on the paper map by means of spots of light (513) emitted by the opto-touch foil (512). Each time the user activates an hyperlink ("geographic link") on the first physical document (509), the spot of light corresponding to this location blinks on the paper map.

In a preferred embodiment, when a location is selected (by touching) either on its illuminated position on the paper map or on the illuminated hyperlinked item on the first physical document, the Web Browser program (503) sends a HTTP request (504) to the Web Server (505) identified in the hyperlink table (510). A response (HTTP response) is sent back by the Web Server (505) in the reverse direction to the Web Browser (503). The HTTP response comprises the requested Web page associated with the selected illuminated item (place name on the first physical document) or with the illuminated location (on the paper map).

#### **Opto-touch foil calibration**

On a terrestrial meridian, one meter corresponds (very approximately) to an arc of :

$$F = (90 \times 60 \times 60) / 10.000.000 = 0.0324 \text{ (\"/m) (i.e., seconds of arc per meter)}$$

Let, by definition, **Fr** (mm/unit) be the resolution of the touch foil (i.e., the number of mm over axis X and Y (510) of the touch-foil that correspond to each unit of sensed signal, e.g., mVolts, assuming it is the same for both axis); and

Let **Ms** be the scale of the map (i.e., the number of terrestrial meters over the reference meridian per each mm measured on the map).

From the above definitions, parameter **K** is defined by the formula:

$$K = F \times Fr \times Ms \text{ (\"/ pulse)}$$

Let **LATc**, **LONc**, the latitude and longitude of a calibration location selected on the Web page (measured in seconds of arc),

Let **Xc**, **Yc** the coordinates measured by the touch foil when the user presses on the calibration location on the map,

Let **LATo**, **LONo** the latitude and longitude on the map corresponding to the origin of the coordinates on the touch foil (i.e., to the point on the touch foil for which **X=0** and **Y=0**).

The equations are:

$$LATo = LATc + K \times Yc$$

$$LONo = LONc - K \times Xc$$

Once **LATo** and **LONo** are known, the foil coordinates also called relative coordinates (**Xp**, **Yp**) of any point **P** with latitude and longitude, **LATp**, **LONp**, (measured in seconds of arc) can be computed as follows:

$$Xp = (LONp - LONo) / K$$

$$Yp = (LATo - LAPp) / K$$

### “Geo-links” on the Hyperlink Table

When the hyperlink table of a first physical document is accessed, the “geographic” information comprised in the hyperlink table (i.e., locations names, absolute/geographic coordinates and hyperlinks) is retrieved and stored in the user workstation. (see in the next table, the first four columns of the hyperlink table generated from the above example). Once a second opto-touch foil (foil 2 with a known resolution **Fr**) and a second physical document (for example a paper map with a known map scale **Ms**) have been selected, and once the calibration procedure is achieved (by sensing the foil 2 coordinates (**Xc**, **Yc**) of the calibration location and by using the formulas described here above), the foil 2 coordinates (FOIL 2 **X/Y**) of the locations related to the items referenced in the first physical document are computed (see the last column on the next table). The hyperlink table of the first physical document is completed with the foil 2 coordinates (FOIL 2 **X/Y**) of all “geo-linked” locations. The foil 2 coordinates are transmitted from the user workstation to the second opto-touch foil that decodes them. They are then used to illuminate on the second physical document the position of the locations related to the items referenced in the first physical document.

### Method of Calibrating and Highlighting on a Map Locations referenced in a Physical Document

The method of calibrating and displaying one or a plurality of locations related to items referenced in a first physical document on a second physical document (for example a paper map), using an opto-touch foil placed over this second physical document, comprises the steps of:

- reading from the hyperlink table the absolute coordinates (geographic coordinates such as latitude/longitude) associated with the items referenced in the first physical document;
- selecting a second physical document comprising (i.e., representing) at least the location of one item referenced (i.e., hyperlinked) in the first physical document;
- identifying the scale of this second physical document;
- placing an opto-touch foil aligned over or under the second physical document;
- selecting a calibration location, this step comprising the step of selecting an item referenced on the first physical document and corresponding to a location represented in the second physical document.
- calibrating the opto-touch foil by pressing the opto-touch foil on the selected calibration location;
- highlighting by means of the opto-touch foil the points on the second physical document corresponding to the items referenced in the first physical document;
- selecting an highlighted point on the second physical document by pressing the opto-touch foil on this point;
- highlighting on the first physical document the referenced item corresponding to the selected highlighted point on the second physical document;
- identifying the position on the second physical document of an item referenced on the first physical document by pressing the first opto-touch foil on the point corresponding to the referenced item;
- making the point blinking on the second physical document.

The following example illustrates the present method for locating places of any kind, using conventional paper maps thanks to information provided on physical documents. A driver with a WAP enabled cell phone (like the one shown in Figure 1) is traveling across the Balkans. At some point on the way from Zagrev to Karlovac, the user with his cell phone, access a Web page on:

***<http://www.imisite.org/berserk/dalmatia.html>***.

This Web page provides tourist information, and in particular a publication entitled: ***"Travel Guide to the Balkans (Document: 378)"***, illustrated on Figure 6. This publication describes the region the driver intends to visit today. On page 16 of this document, as illustrated on Figure 8, the driver finds an interesting reference describing several places on his route. The driver then takes a paper map of the region and tries to locate on this map the places referenced on this page of the travel guide. Figure 16 shows the paper map of the region and the document referencing some geographic locations.

Glancing over the map, the driver locates several places referenced on page 16 of the document, like Karlovac, Knin, Udbina and Gracac. However, he cannot

locate other referenced places, like Zagrev, Hotel Bellevue, Slunj and Plitvice. Motivated by the title and the content of this section "**Getting Around, Taking Precautions**", the driver is particularly interested to determine the location on his route of the "**Hotel Bellevue**". But "**this place is represented on the map !**".

To locate on the map all places referenced (i.e., the "geographic links") on this page (and more particularly, the "**Hotel Bellevue**"), once identified the document number (e.g, 387) and the page of this document (e.g., 16) as has been described before, as illustrated on Figure 1, the user takes an opto-touch foil (104), connects it to his cell phone (103) (used as workstation) and places and fixes the map (105) underneath the opto-touch foil. Then the following tasks are performed:

#### i) Calibrating the opto-touch foil

The calibration of the opto-touch foil is illustrated in Figure 17. To calibrate the opto-touch foil, the user :

- calls the opto-touch foil calibration procedure (1700) from his workstation;
- enters the scale of the map (second physical document) scale (1701) (e.g., 1 / 1.250.000);
- selects as calibration location (1702), from the list of locations shown on the display of his workstation any location (e.g. **Knin**). This location must correspond to a point represented on the map. To maximize the precision of this calibration procedure, it is advisable to choose, among all the locations displayed at the same time on the workstation and represented on the map, a location positioned far from both foil axis (i.e., far from axis X, and far from axis Y) or, what is equivalent, relatively close to the diagonal axis  $X=Y$  and far from the foil origin point  $X=Y=0$ .
- presses the opto-touch foil (e.g., by using a pencil) on the point of the map where the selected calibration location (1703) is located (i.e., **Knin**).

Once performed the calibration procedure, the foil 2 coordinates corresponding to referenced items are computed and the hyperlink table is updated as follows:

Doc: 0387		Title: "Travel Guide to the Balkans"	Author: Bosiljko Vasilj Medjugorje, Bosnia & Herzegovina Phone: (387-88) 650-055	
		Date: 28 / 01/ 2000	ISBN: 84-344-0856-2	
Calib. Location:		URL:	Map Scale:	Foil Resolut.
Knin		<a href="http://www.linder.com/berserk/dalmatia.html">http://www.linder.com/berserk/dalmatia.html</a>	1,250,000	0,2
Pg: 16				
LOCATION	FOIL 1 X/Y	HYPERLINK	LAT / LONG	FOIL 2 X/Y
Zagrev	125 110	<a href="http://www.interconti.com/croatia/zagreb/hotel_zagic.html">http://www.interconti.com/croatia/zagreb/hotel_zagic.html</a>	N 045° 36' 04" E 016° 12' 20"	- 000 - 000
Karlovak	170 110	<a href="http://www.hr/hrvatska/HRgradovi/Karlovac/uvod-en.htm">http://www.hr/hrvatska/HRgradovi/Karlovac/uvod-en.htm</a>	N 045° 28' 17" E 015° 43' 35"	060 045
Knin	190 110	<a href="http://www.sibenik-knin.com/">http://www.sibenik-knin.com/</a>	N 044° 03' 21" E 016° 15' 26"	235 655

Hotel Bellevue	35 155	<a href="http://www.tel.hr/np-plitvice/smje/bellevue.htm">http://www.tel.hr/np-plitvice/smje/bellevue.htm</a>	N 044° 18' 46" E 015° 45' 06"	085 585
Slunj	145 180	<a href="http://mx1.xoom.com/slunj/">http://mx1.xoom.com/slunj/</a>	N 045° 13' 53" E 015° 40' 18"	050 155
Plitvice	170 180		N 044° 52' 38" E 015° 44' 37"	070 290
Udbina	195 180	<a href="http://www.aiha.com/english/partners/biozad/zdkn.htm">http://www.aiha.com/english/partners/biozad/zdkn.htm</a>	N 044° 31' 19" E 015° 45' 22"	110 445
Gracac	215 180	<a href="http://www.crotours.com/English/Beauties/Parks/velebit.htm">http://www.crotours.com/English/Beauties/Parks/velebit.htm</a>	N 044° 21' 07" E 015° 48' 36"	125 555

Note: "geo-link" **Plitvice** has no associated hyperlink. This is an example of non-hyperlinked "geo-link" location.

## 5 ii) Highlighting on the map locations related to items referenced on the first physical document

As shown on Figure 18, once the opto-touch foil has been calibrated, the locations inside the geographic area covered by the map (second physical document), related to items referenced in the first physical document (i.e., highlighted on it), are automatically highlighted on the map in the form of bright spots of light (1801) emitted by the opto-touch foil. These spots of lights are used by the user to see at a glance the positions of all referenced items on the map. On Figure 18, seven locations have been highlighted on the map, five of them are identified by a legend on the map (corresponding to the towns of Karlovac, Knin, Slunj, Udbina and Gracac). The other two light spots, not referenced on the map, correspond to any one of the remainder three places referenced on the Web page (i.e., Zagrev, Hotel Bellevue or Plitvice). These locations can be identified by the user.

## 20 iii) Identifying the location on the map of the items referenced in the first physical document

As shown in Figure 19, to recognize a location highlighted on the map (second physical document) but not identified (i.e., named) on this map, the user presses the opto-touch foil with a fingertip on the point (illuminated spot) corresponding to this location (1901). By doing this:

- The light spot emitted by the opto-touch foil (104) placed over/under the map (105) blinks on this location (1901), and
- The light spot emitted by the opto-touch foil (101) placed over/under the first physical document blinks on the corresponding referenced item (1902).

Figure 19 shows how the user can locate in this way the "**Hotel Bellevue**".

## 30 iv) Accessing the hyperlinked information

As shown on Figure 20, to access the information or service associated with an item referenced in the first physical document, the user activates the corresponding hyperlink by pressing:



- on the point on the map (2001) corresponding to the location of this item, or
- on the point on the first physical document (2002) corresponding to the item.

The hyperlinked URL, if any, is then accessed throughout the Web, and the information on this URL address (2000) is retrieved and displayed on the user workstation. Figure 15 shows the information concerning the "**Hotel Bellevue**" that is retrieved from the Web simply by activating the corresponding "geographic link" (2001) from the paper map.

Practically all types of published paper maps (e.g., provided by geographic or cartographic services or by third parties), at any scale, can advantageously be used by the present invention. Paper maps (511) can be published and used independently of published physical documents (509). Because the hyperlink tables (510) created for physical documents (509) comprise the cartographic coordinates (i.e., the "geographic links") of the locations to highlight on maps, hotels, restaurants, oil posts, pharmacies, shops or businesses of any type (513) can be easily located and identified on these maps when browsing physical documents, thus attracting the interest of potential customers. Public authorities can help people to locate, by means of hard-copy documents and maps, all kinds of services, resources or places of cultural or economic interest.

#### **METHOD OF HIGHLIGHTING ON A PHYSICAL DOCUMENT LOCATIONS RELATED WITH ITEMS SELECTED IN THE SAME DOCUMENT**

An alternate embodiment of the present invention is illustrated in Figure 21. This particular embodiment discloses a method and system for selecting and accessing information or services by touching hyperlinked items (for example 6. *Musee de la Chasse et de la Nature*) on a physical document and for illuminating on the same physical document (Map of Paris) items or locations related to said hyperlinked items.

#### **TYPICAL APPLICATIONS**

The present invention can be used in many applications. The differences between these applications are mainly due to the type of graphical information shown on the hard-copy documents and to the type of document used to trigger the hyperlinks and "geo-links":

##### **Yellow Pages**

The "Yellow Pages" application is detailed in Figures 22, 23 and 24.

Figure 22 shows a page with a list of "Restaurants" in the "Yellow Pages" of the city of Paris (2206). This page is placed under a touch-foil (2200). A paper map of Paris (2207) is placed under a light emitting foil (2201). Both foils are connected to a user workstation (2204) (e.g., a WAP enabled cell phone). When the user presses the touch-foil (2200) on the left column on a printed item (i.e., the name of a

restaurant) (2202), the hypermedia information associated to this item (i.e., the information related with this restaurant) (2205) is retrieved from the Web and displayed on the user workstation (2204). At the same time, the geographic coordinates of this restaurant are retrieved from the Web and are transmitted from the user workstation (2204) to the light emitting foil (2201). The light emitting foil highlights the location of the restaurant (2203) on the paper map (2207).

Figure 23 shows how the phone number of a restaurant can be automatically dialed (2302), when the user presses the touch-foil (2300) on the printed telephone number (2301) of the restaurant in the column in the center. Thus, it is possible to initiate a phone conversation directly by pressing the touch foil with a finger tip.

Figure 24 shows how, by pressing the touch-foil (2400) on the right column on a printed address (2401), (i.e., the address of a restaurant), the coordinates of this restaurant can be retrieved and transmitted from the user workstation to the opto-foil (2402). The opto-foil highlights the location of the restaurant (2403) on the paper map and the selected address (2404) is displayed on the screen of the user workstation.

### Installation and Engineering Instructions

A technician inspects a complex mechanical equipment, with an installation and service manual comprising explanatory descriptions referencing parts and subassemblies represented on separate hard-copy drawings and schemes. With an opto-touch foil placed on the installation and service manual, the technician can immediately see some items highlighted by luminous spots. These illuminated items are identified as hyperlinked items and can be used to access additional information on a remote Web server or on a local computer.

When the technician touches with a fingertip one of these illuminated items (e.g., the name of a part), multimedia instructions to show how the part needs to be installed, are instantly shown on the display of his workstation. At the same time, the workstation informs the technician that this part is graphically represented (separately or integrated into an assembly or subassembly) on an auxiliary hard-copy drawing or scheme.

This hard-copy drawing or scheme is placed, by the technician, under the same or a another opto-touch foil. The location of the part appears illuminated as a blinking light spot over the drawing or scheme. The purpose of the present system is to help the technician to identify the part in the complete assembly, and to help him to see how this part interacts with the other parts.

The technician doesn't need to browse through the computer screens to discover how the part is called, what to do with it, where it is located and how it fits with the other parts. He doesn't needs anymore to navigate on a computer terminal among different alternatives paging through multiple menus and choices. A single printed copy of the installation and service manual and of the different drawings of the equipment is sufficient to navigate with the system according to the present invention. There is no need to reference the different parts on the printed manual and the drawings by means of specific drawings names, numerals or pointers (as is the common practice with engineering documentation). The technician has just to press

with his finger on the item illuminated on the installation manual to see automatically illuminated the position of this item over a separate graphical representation of the equipment to install or to repair. Therefore, by means of the present invention, hard-copy technical documents and drawings are less complex, clearer and easier to use. Manuals and drawings don't need any more to be populated with cumbersome alphabetic and numeric cross references.

### Courses and Textbooks

Extensive reading is easier to do on paper, but animated video explanations and demonstrations are much more effective for some purposes. The two can be tied together by placing hyperlinked items in a textbook. These hyperlinked items can provide optical pointers to items on figures, diagrams or schemes printed in the same textbooks. For example, it should be possible to highlight on pictures of human anatomy, organs described in an "Advanced Surgery Techniques" book published for students of medicine.

Being apparent that, apart from the herein described applications, there are many other possible applications of this invention, what has been described is merely illustrative of the application of the principles of the present invention. Other arrangements and methods can be implemented by those skilled in the art without departing from the spirit and the scope of the present invention.



**Claims**

1. A method, for use on a user system (500), of creating hyperlinks from hyperlinked items (506) referenced in a first physical document (509) to particular points (513) on a second physical document (511), said method comprising the steps of:

- 5
- creating an hyperlink table (510) for the first physical document (509); said first physical document comprising one or a plurality of pages;
  - storing in said hyperlink table (510) an identification of the first physical document (509);

for each page of said first physical document (509):

- 10
- storing in said hyperlink table (510) an identification of the page and an identification of hyperlinked items (506) defined on said page;
  - associating to each hyperlinked item (506) referenced in the first physical document (509), a point on a page of a second physical document (511);
  - storing (703) in said hyperlink table (510) for each hyperlinked item (513),  
15 absolute coordinates of the associated point;
  - determining the position of points pressed on a first opto-touch foil (507); the first opto-touch foil being placed and aligned (704) over or under the page of the first physical document (509); said first opto-touch foil being pressed (705) at points corresponding to the position of said hyperlinked items (506);
  - storing in the hyperlink table (510), the position of the points pressed, said  
20 hyperlink table comprising for each hyperlinked item, an indication of its position on the page of the first physical document.

2. The method according to the preceding claim comprising the further step of:

- 25
- computing from the absolute coordinates, foil coordinates corresponding to the position on a second opto-touch (512) foil placed and aligned over or under one of a page of said second physical document (511), of each point associated with an hyperlinked item (506);
  - storing the foil coordinates in the hyperlink table (510).

30

3. The method according to any one of the preceding claims comprising the further step of:

- storing in said hyperlink table (510) an identification and a location of information or service associated with each defined hyperlinked item.

35

4. The method according to any one of the preceding claims wherein said user system (500) is connected to a communication network (501) comprising one or a plurality of servers (505), and wherein the information or services associated with the hyperlinked items are located on said one or plurality of servers (505).

5. The method according to any one of the preceding claims wherein the information or services associated with the hyperlinked items are located on the user system (500).
- 5 6. The method according to any one of the preceding claims wherein the step of storing in the hyperlink table (510) an identification and a location of information or service associated with each defined hyperlinked item comprises the further step of:
- storing a destination address in the communication network where the information or service associated with the hyperlinked item can be accessed.
7. The method according to any one of the preceding claims wherein:
- 10
- said communication network (501) is an Internet Protocol (IP) network;
  - said servers (505) are Web servers;
  - said user system (500) comprises a Web browser (503);
  - said destination address is an Uniform Resource Locator (URL address);
  - said information or service are Web pages.
- 15 8. The method according to any one of the preceding claims wherein said second physical document is a geographic map and said absolute coordinates are geographic coordinates preferably expressed in terms of latitude and longitude.
9. The method according to any one of the preceding claims wherein:
- 20
- said first physical document (509) and said second physical document (511) are a same and single physical document;
  - said first opto-touch foil (507) and said second opto-touch foil (512) are a same and single opto-touch foil.
10. A user system (500) comprising means adapted for carrying out the method according to any one of the preceding claims.
- 25 11. A system comprising:
- a first opto-touch foil (507) to be placed and aligned over or under a page of a first physical document (509);
  - a connection between said first opto-touch-foil (507) and said user system (500);
  - a user system (500) according to the preceding claim;

30

  - a second opto-touch foil (512) to be placed and aligned over or under a second physical document (511);
  - a connection between said second opto-touch-foil (512) and said user system (500).
12. A computer program comprising computer readable instructions for carrying out
- 35 the method according to any one of claims 1 to 9.

13. A method, for use on a user system (500), of activating hyperlinks from hyperlinked items (506) referenced (506) in a first physical document (509) to particular points (513) on a second physical document (511), said method comprising the steps of:

- 5 • identifying a first physical document (509);
- identifying a page in this first physical document;
- determining the position of a point pressed on a first opto-touch foil (507) placed and aligned over or under the identified page (509); said first opto-touch foil (507) being pressed at a point corresponding to a selected hyperlinked item (506);
- 10 • identifying the selected hyperlinked item referring to an hyperlink table associated with the first physical document (509), this hyperlink table comprising an indication of the position of each hyperlinked item referenced in the identified page of the first physical document;
- identifying the position on a page of a second physical document of a point associated with the identified selected hyperlinked item referring to the
- 15 hyperlinked table (510), said hyperlinked table comprising for each hyperlinked item referenced in the first physical document (509), the position of a point on a page of a second physical document (511);
- sending to a second opto-touch foil (512) the position of the point associated with the selected hyperlinked item (506) on the page of the second physical
- 20 document (511), said second opto-touch foil being placed and aligned over or under the page of the second physical document; said second opto-touch (512) foil being used for highlighting the point associated with the selected hyperlinked item.

25 14. The method according to the preceding claim comprising the further step of:

- sending to the first opto-touch foil (507) the position of the hyperlinked items referenced in the identified page for visualizing said hyperlinked items on said first physical document (509).

30 15. The method according to any one of claims 13 to 14 comprising the further step of:

- sending to the second opto-touch foil (512) the position of the points associated with the hyperlinked items for visualizing said points on said second physical document (511).

35 16. The method according to any one of claims 13 to 15 comprising the further steps of:

- identifying and locating information and service associated with the selected hyperlinked item referring to the hyperlink table, said hyperlink table comprising

for each hyperlinked item the identification and location of the information and service associated with the hyperlinked item;

- accessing the information or service associated with the selected hyperlinked item.

5 17. The method according to the preceding claim wherein said user system (500) is connected to a communication network (501) comprising one or a plurality of servers (505) and wherein the information or services associated with the hyperlinked items are located on said one or plurality of servers (505) or locally on the user system (500).

10 18. The method according to claim 16 wherein the information or services associated with the hyperlinked items are located on the user system (500).

19. The method according to any one of claims 13 to 18 comprising the further step of:

- 15
- accessing the hyperlink table (510) associated with the identified first physical document (509).

20. The method according to any one of claims 16 to 19 wherein the step of identifying and locating information and service associated with the selected hyperlinked item referring to the hyperlink table, comprises the step of:

- 20
- determining a destination address in the communication network where the information or service associated with the selected hyperlinked item can be accessed referring to said hyperlink table (510).

21. The method according to any one of claims 16 to 20 wherein:

- 25
- said communication network (501) is an Internet Protocol (IP) network;
  - said servers (505) are Web servers;
  - said user system (500) comprises a Web browser (503);
  - said destination address is an Uniform resource Locator (URL address);
  - said information or service are Web pages.

22. The method according to any one of claims 13 to 21 wherein a page of a physical document is a portion of said physical document.

30 23. The method according to any one of claims 13 to 22 wherein the step of identifying the position on a page of a second physical document of a point associated with the identified selected hyperlinked item referring to the hyperlinked table (510), comprises the further steps of

- 35
- identifying absolute coordinates of the associated point referring to the hyperlink table (510);



- computing from the absolute coordinates, foil coordinates corresponding to the position on the second opto-touch (512) foil of the point associated with the hyperlinked item (506);

5 24. The method according to any one of claims 13 to 23 wherein said second physical document is a geographic map, said hyperlinked items are related to geographic locations, and said absolute coordinates are geographic coordinates preferably expressed in terms of latitude and longitude.

25. The method according to any one of the claims 13 to 24 wherein:

- said first physical document (509) and said second physical document (511) are a same and single physical document;
- said first opto-touch foil (507) and said second opto-touch foil (512) are a same and single opto-touch foil.

26. A user system (500) comprising means adapted for carrying out the method according to any one of claims 13 to 24.

15 27. A system comprising:

- a first opto-touch foil (507) to be placed and aligned over or under a page of a first physical document (509);
- a connection between said first opto-touch-foil (507) and said user system (500);
- a user system (500) according to the preceding claim;
- a second opto-touch foil (512) to be placed and aligned over or under a second physical document (511);
- a connection between said second opto-touch-foil (512) and said user system (500).

25 28. A computer program comprising computer readable instructions for carrying out the method according to any one of claims 13 to 24.

**THIS PAGE BLANK (USPTO)**

## SYSTEM AND METHOD FOR LOCATING ON A PHYSICAL DOCUMENT ITEMS REFERENCED IN ANOTHER PHYSICAL DOCUMENT

### *Abstract*

5           The present invention generally relates to interactive hypermedia systems and more particularly to a method and system for locating on a physical document items referenced in another physical document. The present invention discloses a method and system for creating hyperlinks from items (e.g. words, pictures, foot  
10 notes, symbols, icons) on a first physical document to particular points on a second physical document (manuscript or printed document), for activating these hyperlinks simply by touching the first document, and for highlighting by means of a light emitting source, the position of the items on the second document. In a preferred embodiment, the present invention discloses a method and system for highlighting  
15 on a hard-copy map the geographic positions of places referenced in a hard-copy document.

Figure 5

**THIS PAGE BLANK (USPTO)**

FR 9 2000 0039

F. Incertis

1 of 24

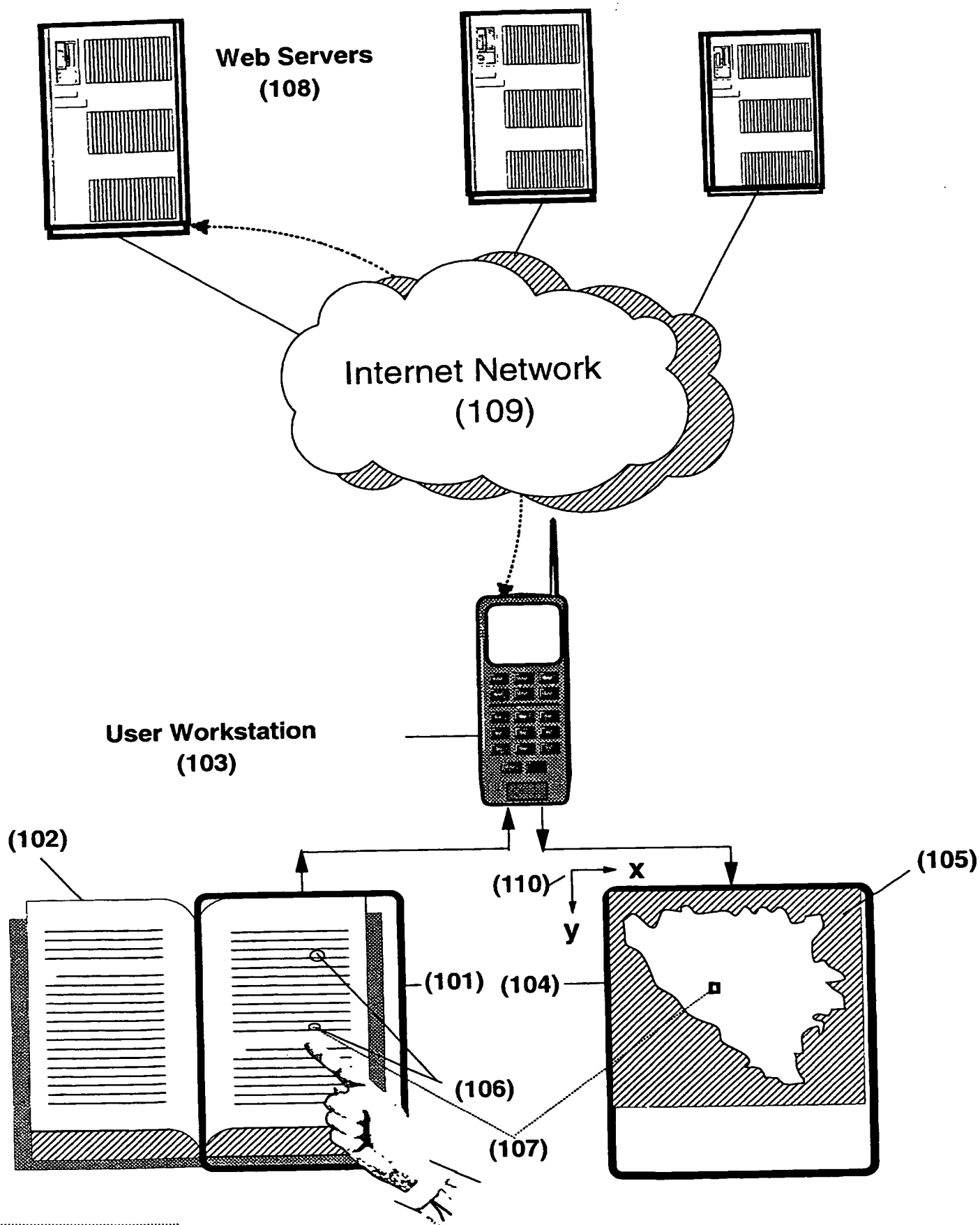
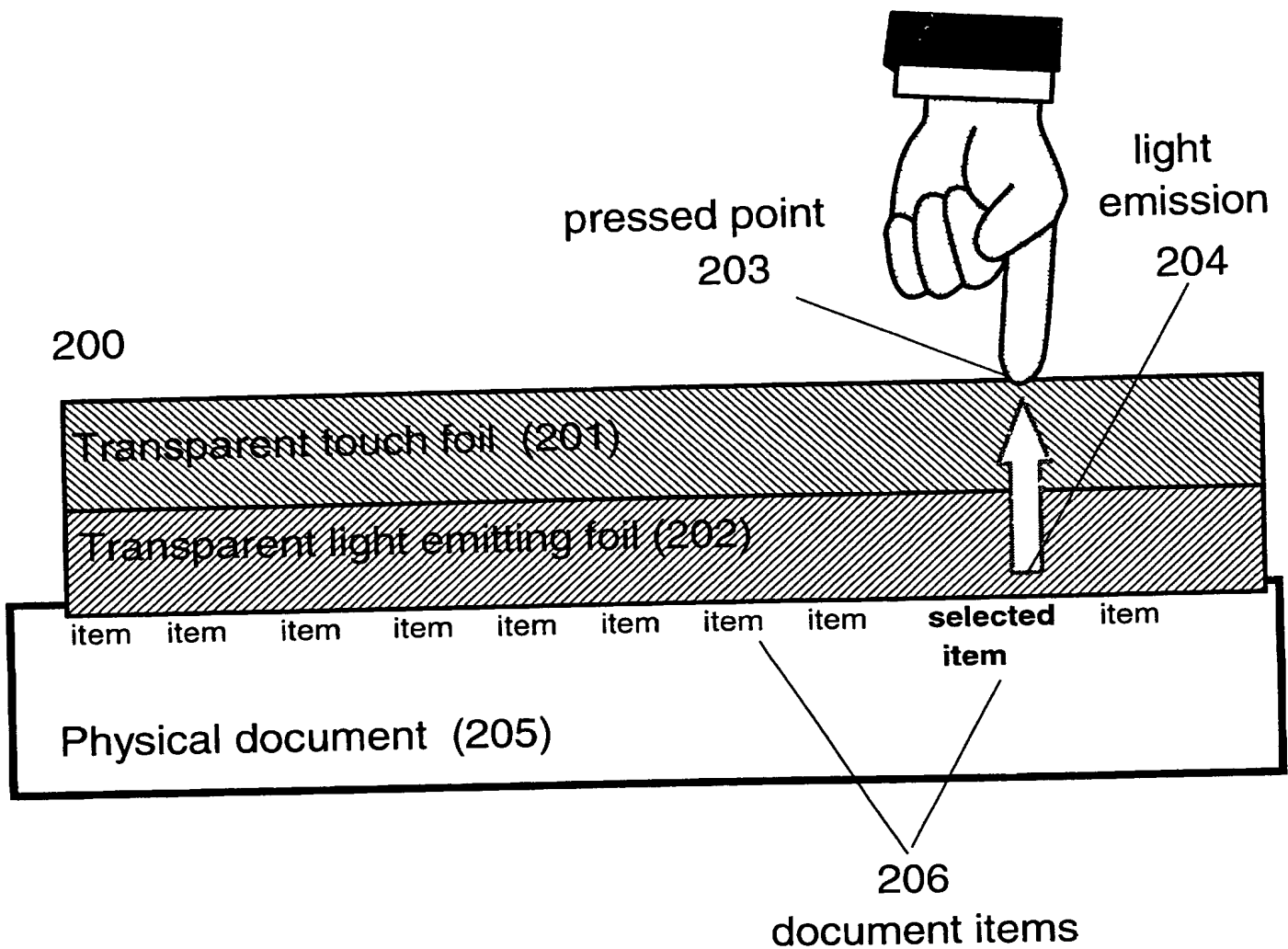


Fig. 1: Main components of the invention

FR 9 2000 0039  
F. Incertis  
2 of 24

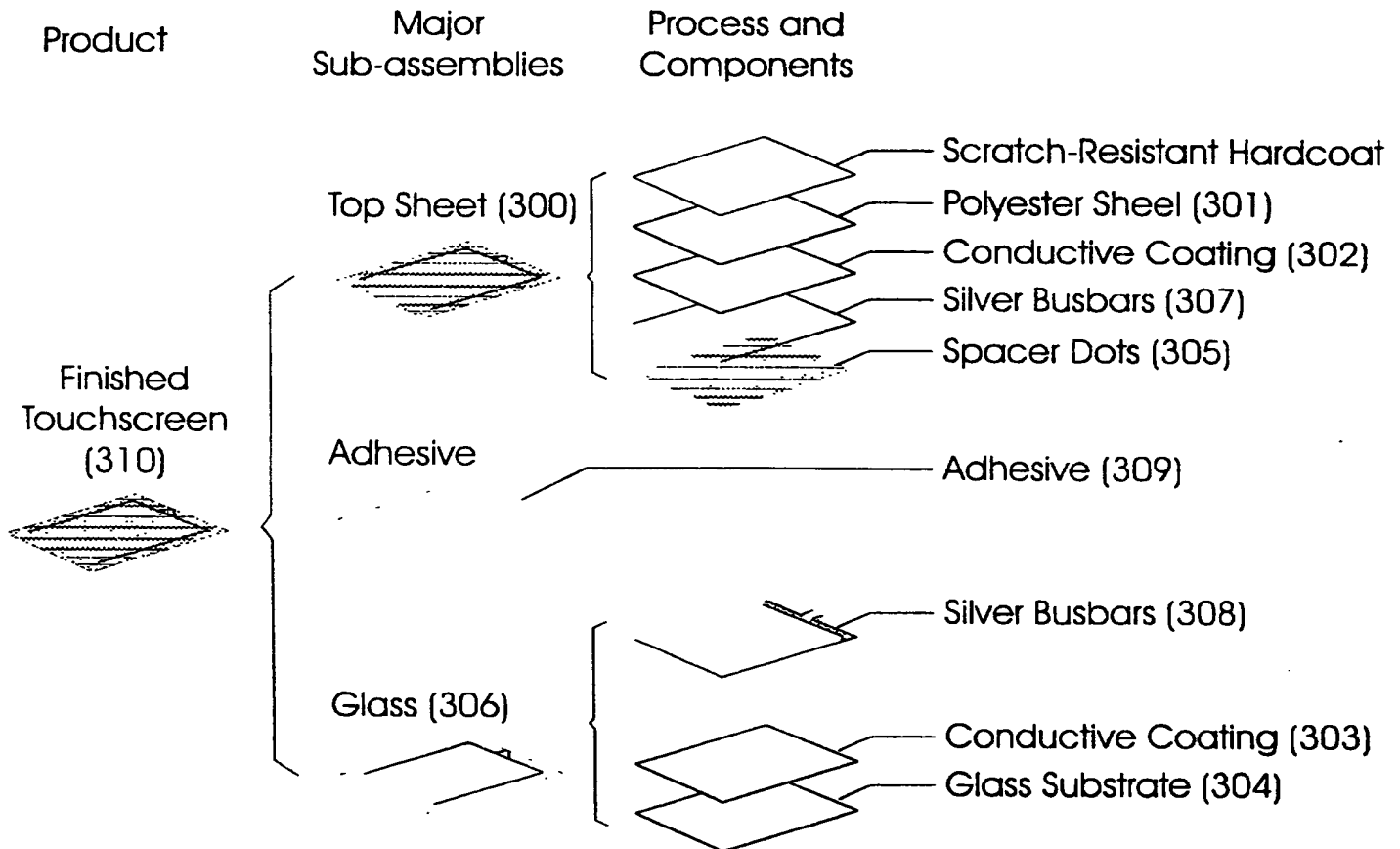


**Fig. 2: The opto-touch foil**

FR 9 2000 0039

F. Incertis

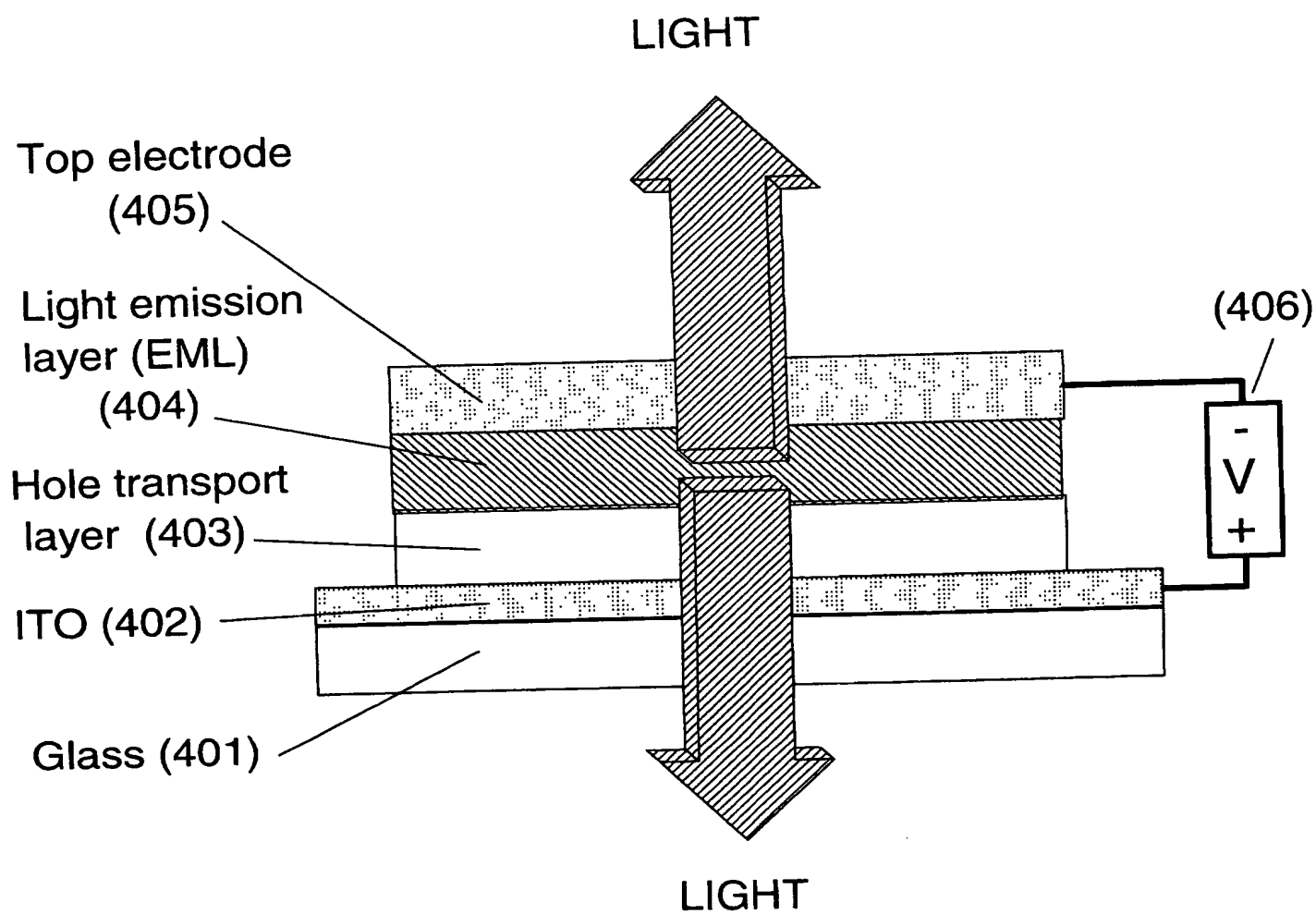
3 of 24

**Fig. 3: Touch Foil Technology**

FR 9 2000 0039

F. Incertis

4 of 24

**Fig. 4: Light-emitting foil technology**



FR 9 2000 0039

F. Incertis

5 of 24

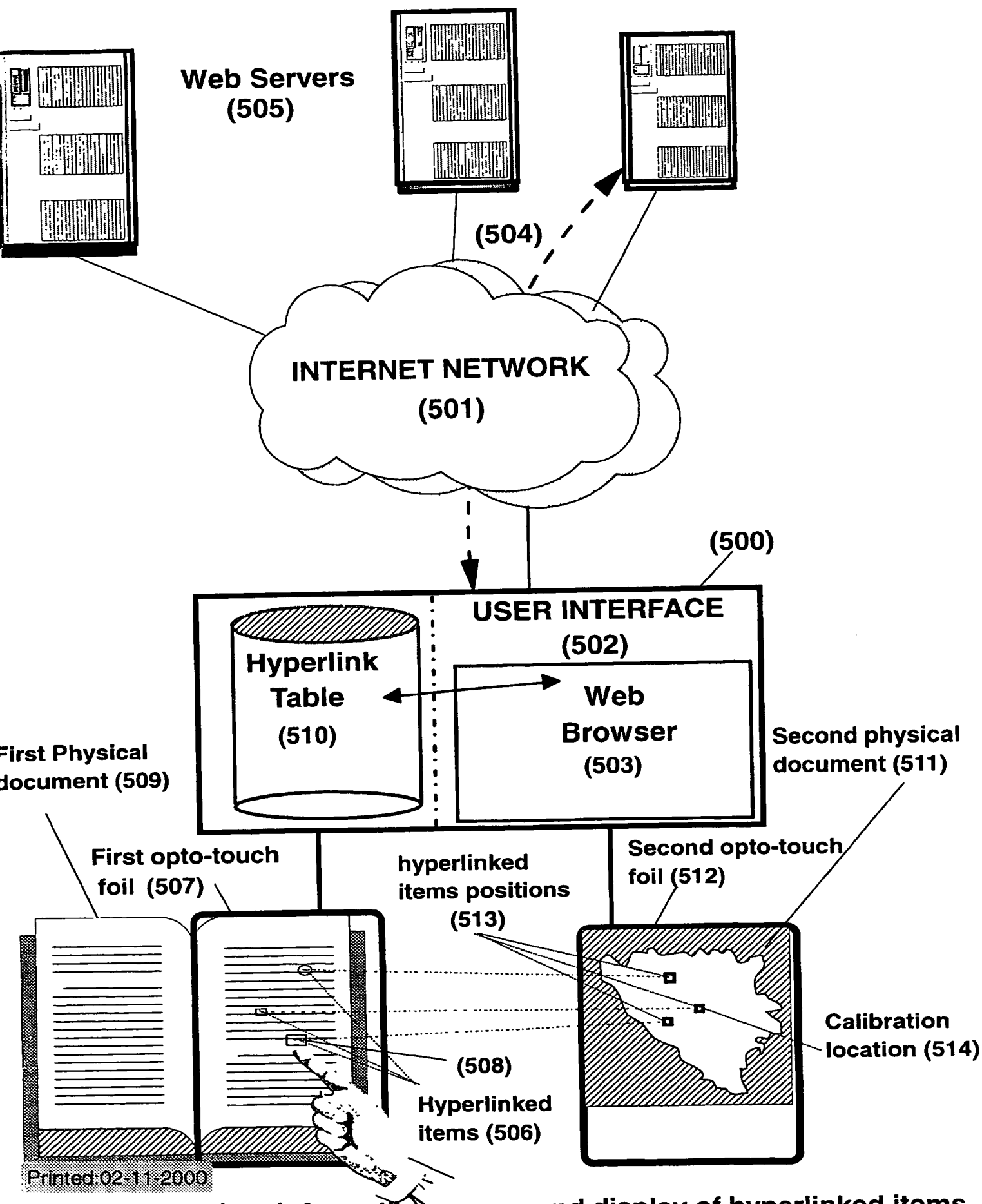


Fig. 5: Selection, information access and display of hyperlinked items

FR 9 2000 0039

F.Incertis

6 of 24

The Ruzic's

*Travel Guide to the Balkans*<http://www.imisite.org/berserk/dalmatia.html>

Document: 387

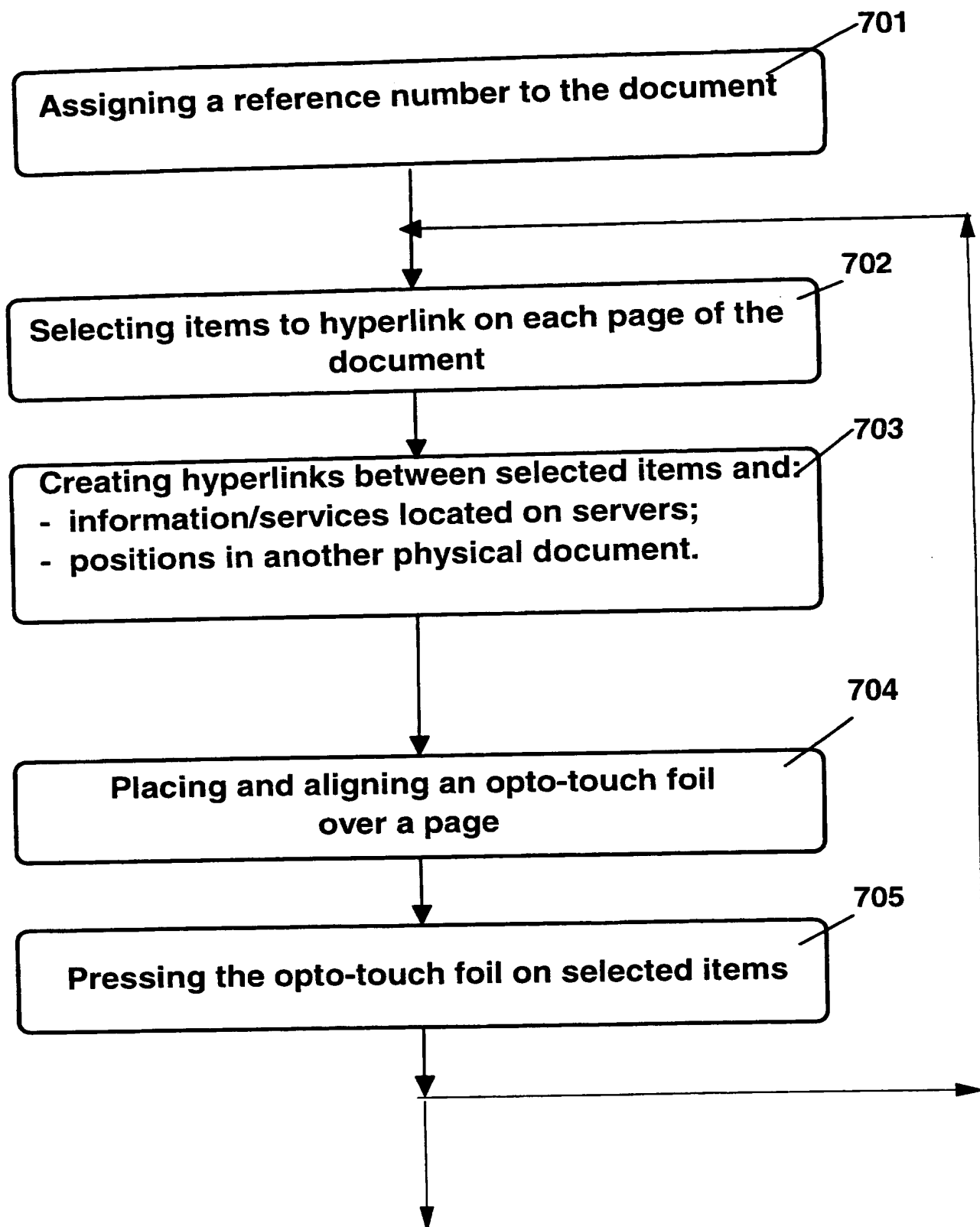
© Bosiljko Vasilj  
Medjugorje, Bosnia and Herzegovina  
Telephone: (387-88) 650-055

Fig. 6: Physical document

FR 9 2000 0039

F. Incertis

7 of 24

**Fig. 7- Method of creating hyperlinks on physical documents**

FR 9 2000 0039

F. Incertis

8 of 24

801

### Zagreb to Mostar and Vicinity

#### **ZAGREB**

Rental cars in Zagreb, the capital of Croatia, are becoming hard to come by due to NATO's deployment. It is recommended that reservations be made in advance in order to avoid delays. If insurance is purchased when renting, be advised that the moment you cross into Bosnia proper it is no longer valid. Drivers in Croatia are fair, but in Herzegovina and Bosnia itself they are outright dangerous. Take extreme precautions. If you don't do it anywhere else in the world, in Bosnia and Herzegovina you must drive defensively.

#### **Getting Around, Taking Precautions**

If traveling from Zagreb via Karlovac and down through Knin you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the Hotel Bellevue and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include Slunj, Plitvice, Udbina, and Gracac. Between them is little or nothing.

#### **Map of KARLOVAC**

If you travel this route in winter, the conditions can be very rough. Ice, snow and deep drifts are common. In many places, the road falls off into steep gorges. Take extreme caution. If you go off one of these gorges, it may be Spring before you are found. There is traffic along the road all day and late into the night when trucks use it to beat the daytime

- 16 -

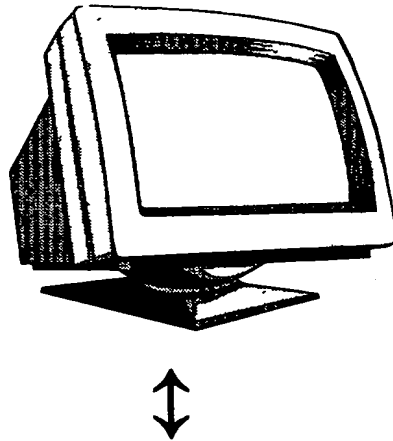
802

**Fig. 8: Items are selected and hyperlinks are created**

FR 9 2000 0039

F.Incertis

9 of 24



Doc 1 2 3 4 5 6 7 8 9 0 Pg

Zagreb to Mostar and Vicinity**ZAGREB**

Rental cars in Zagreb, the capital of Croatia, are becoming hard to come by due to NATO's deployment. It is recommended that reservations be made in advance in order to avoid delays. If insurance is purchased when renting, be advised that the moment you cross into Bosnia proper it is no longer valid. Drivers in Croatia are fair, but in Herzegovina and Bosnia itself they are outright dangerous. Take extreme precautions. If you don't do it anywhere else in the world, in Bosnia and Herzegovina you must drive defensively.

**Getting Around, Taking Precautions**

If traveling from Zagreb via Karlovac and down through Knin you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the Hotel Bellevue and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include Slunj, Plitvice, Udbina, and Gracac. Between them is little or nothing.

**Map of KARLOVAC**

If you travel this route in winter, the conditions can be very rough. Ice, snow and deep drifts are common. In many places, the road falls off into steep gorges. Take extreme caution. If you go off one of these gorges, it may be Spring before you are found. There is traffic along the road all day and late into the night when trucks use it to beat the daytime

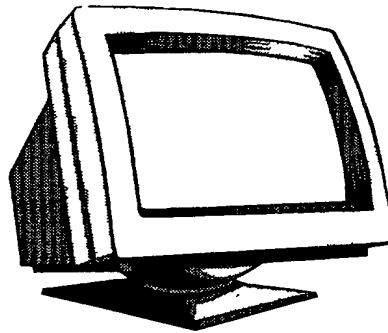

- 16 -

Fig. 9: The opto-touch foil is placed and aligned over the document

FR 9 2000 0039

F.Incertis

10 of 24


 (X, Y)

Doc 1 2 3 4 5 6 7 8 9 0 Pg

Zagreb to Mostar and Vicinity**ZAGREB**

Rental cars in Zagreb, the capital of Croatia, are becoming hard to come by due to NATO's deployment. It is recommended that reservations be made in advance in order to avoid delays. If insurance is purchased when renting, be advised that the moment you cross into Bosnia proper it is no longer valid. Drivers in Croatia are fair, but in Herzegovina and Bosnia itself they are outright dangerous. Take extreme precautions. If you don't do it anywhere else in the world, in Bosnia and Herzegovina you must drive defensively.

**Getting Around, Taking Precautions**

If traveling from **Zagreb** via **Karlovac** and down through **Knin** you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the **Hotel Bellevue** and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include **Slunj**, **Plitvice**, **Udbina**, and **Gracac**. Between them is little or nothing.

**Map of KARLOVAC**

If you travel this route in winter, the conditions can be very rough. Ice, snow and deep drifts are common. In many places, the road falls off into steep gorges. Take extreme caution. If you go off one of these gorges, it may be Spring before you are found. There is traffic along the road all day and late into the night when trucks use it to beat the daytime

- 16 -

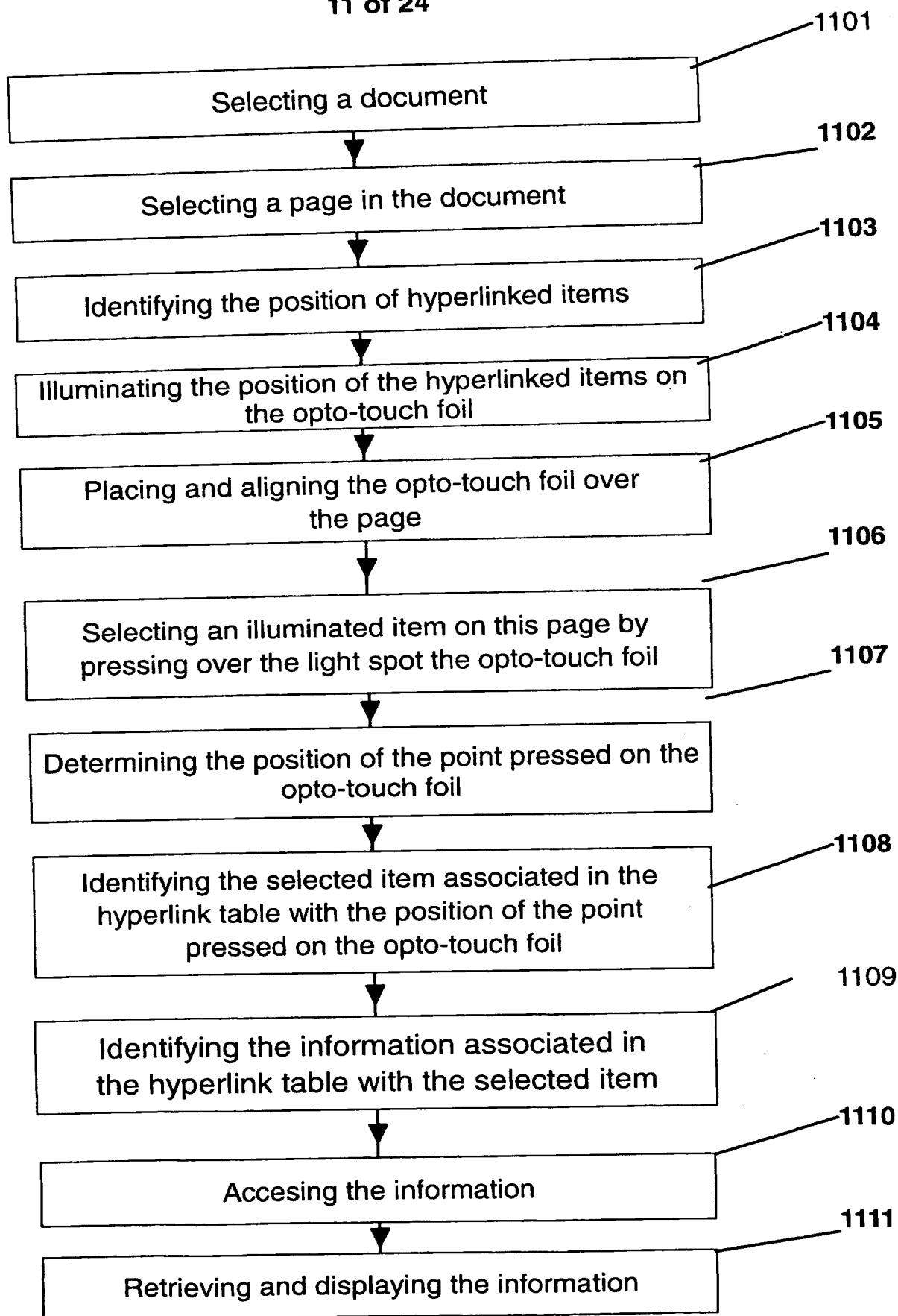


Fig. 10: The user presses the opto-touch foil on selected items

FR 9 2000 0039

F. Incertis

11 of 24



FR 9 2000 0039

F.Incertis

12 of 24

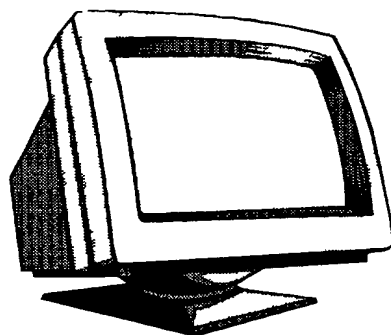
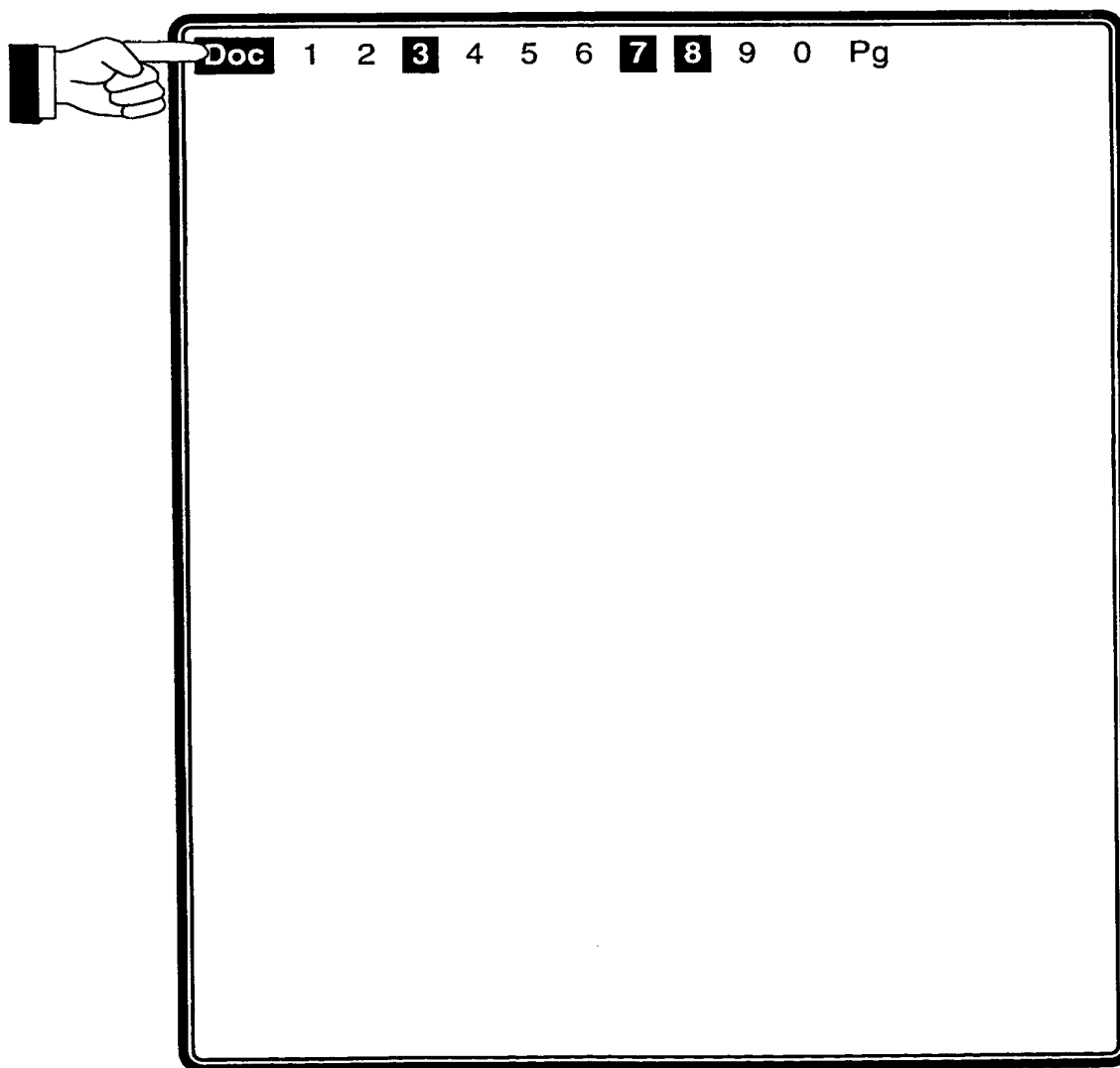
 $\updownarrow$  (X, Y)

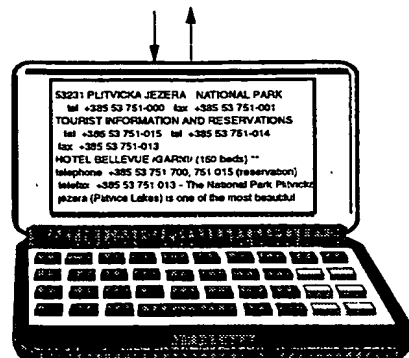
Fig. 12: Use of the opto-touch foil to enter the reference number of the document



FR 9 2000 0039

F.Incertis

13 of 24



↑↓ (X, Y)

Doc **1** 2 3 4 5 **6** 7 8 9 0 Pg

### Zagreb to Mostar and Vicinity

#### **ZAGREB**

Rental cars in Zagreb, the capital of Croatia, are becoming hard to come by due to NATO's deployment. It is recommended that reservations be made in advance in order to avoid delays. If insurance is purchased when renting, be advised that the moment you cross into Bosnia proper it is no longer valid. Drivers in Croatia are fair, but in Herzegovina and Bosnia itself they are outright dangerous. Take extreme precautions. If you don't do it anywhere else in the world, in Bosnia and Herzegovina you must drive defensively.

#### **Getting Around, Taking Precautions**

If traveling from **Zagreb** via **Karlovac** and down through **Knin** you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the **Hotel Bellevue** and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include **Slunj**, **Plitvice**, **Udbina**, and **Gracac**. Between them is little or nothing.

#### **Map of KARLOVAC**

If you travel this route in winter, the conditions can be very rough. Ice, snow and deep drifts are common. In many places, the road falls off into steep gorges. Take extreme caution. If you go off one of these gorges, it may be Spring before you are found. There is traffic along the road all day and late into the night when trucks use it to beat the daytime

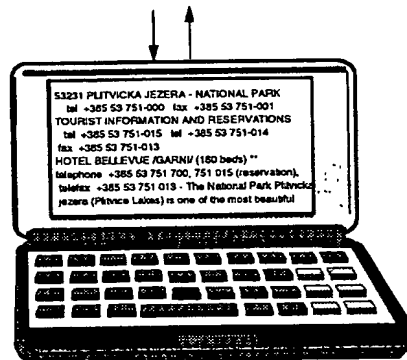
- 16 -

Fig. 13: Use of the opto-touch foil for highlighting hyperlinked items

FR 9 2000 0039

F.Incertis

14 of 24

Doc **1** 2 3 4 5 **6** 7 8 9 0 PgZagreb to Mostar and Vicinity**ZAGREB**

Rental cars in Zagreb, the capital of Croatia, are becoming hard to come by due to NATO's deployment. It is recommended that reservations be made in advance in order to avoid delays. If insurance is purchased when renting, be advised that the moment you cross into Bosnia proper it is no longer valid. Drivers in Croatia are fair, but in Herzegovina and Bosnia itself they are outright dangerous. Take extreme precautions. If you don't do it anywhere else in the world, in Bosnia and Herzegovina you must drive defensively.

**Getting Around, Taking Precautions**

If traveling from **Zagreb** via **Karlovac** and down through **Knin** you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the **Hotel Bellevue** and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include **Slunj**, **Plitvice**, **Udbina**, and **Gračac**. Between them is little or nothing.

**Map of KARLOVAC**

If you travel this route in winter, the conditions can be very rough. Ice, snow and deep drifts are common. In many places, the road falls off into steep gorges. Take extreme caution. If you go off one of these gorges, it may be Spring before you are found. There is traffic along the road all day and late into the night when trucks use it to beat the daytime

- 16 -



Fig. 14:

The user presses the opto-touch foil on an highlighted item

FR 9 2000 0039

F.Incertis

15 of 24

**53231 PLITVICKA JEZERA - NATIONAL PARK**

tel: +385 53 751-000 fax: +385 53 751-001

**TOURIST INFORMATION AND RESERVATIONS**

tel: +385 53 751-015 tel: +385 53 751-014 fax: +385 53 751-013

**HOTEL BELLEVUE /GARNI/ (160 beds) \*\***

telephone: +385 53 751 700, 751 015 (reservation); telefax: +385 53 751 013

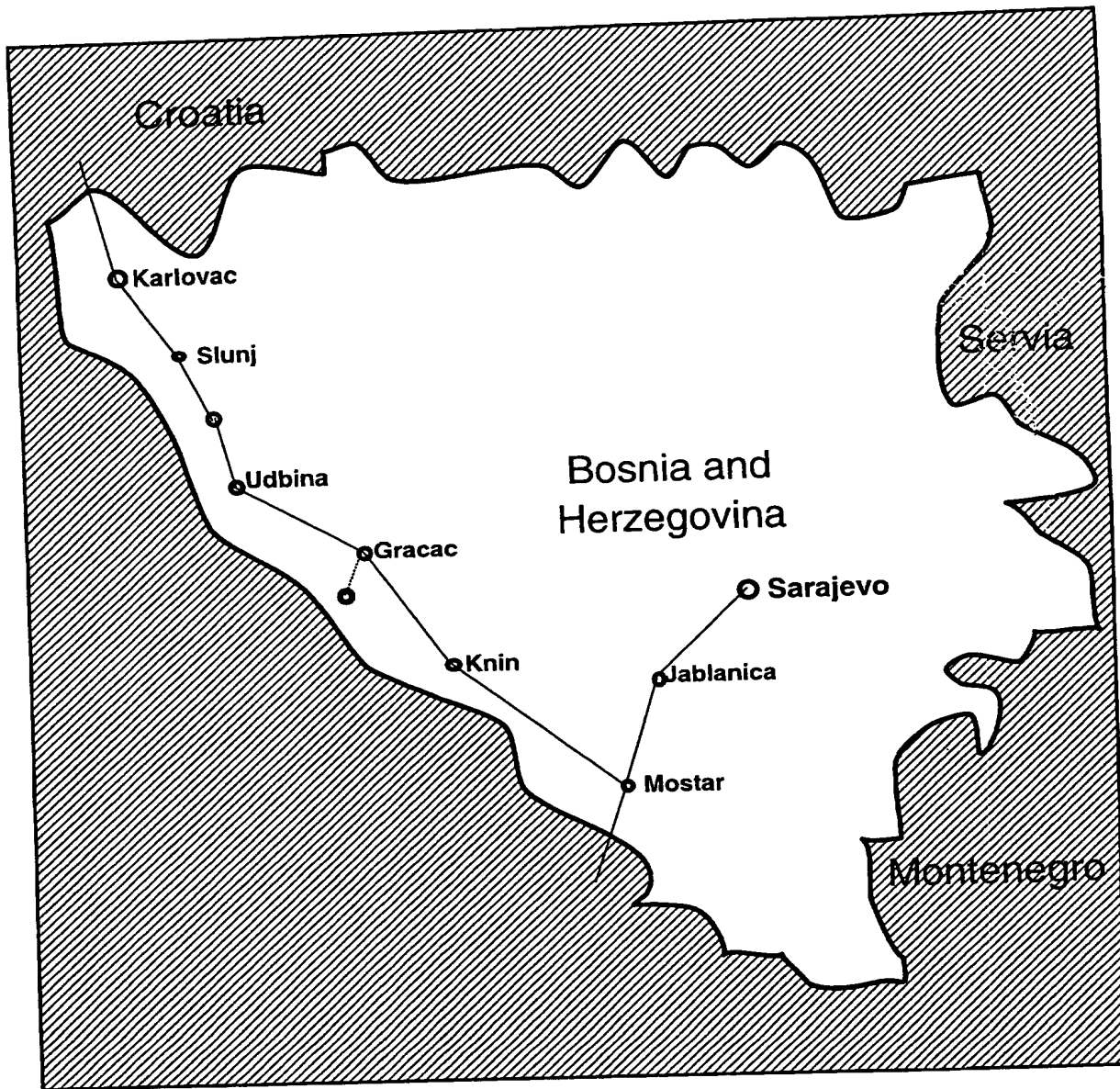
The National Park Plitvicka jezera (Plitvice Lakes) is one of the most beautiful

---

**Return to Balkans Hotel Guide Home Page.****Doc: 387 - "Travel Guide to the Balkans" - Pg: 16 - "Hotel Bellevue"****X= 035 Y= 155 <http://www.tel.hr/np-plitvice/smje/bellevue.htm>**

Fig. 15: The information linked with the highlighted item touched is displayed

F.Incertis  
16 of 24



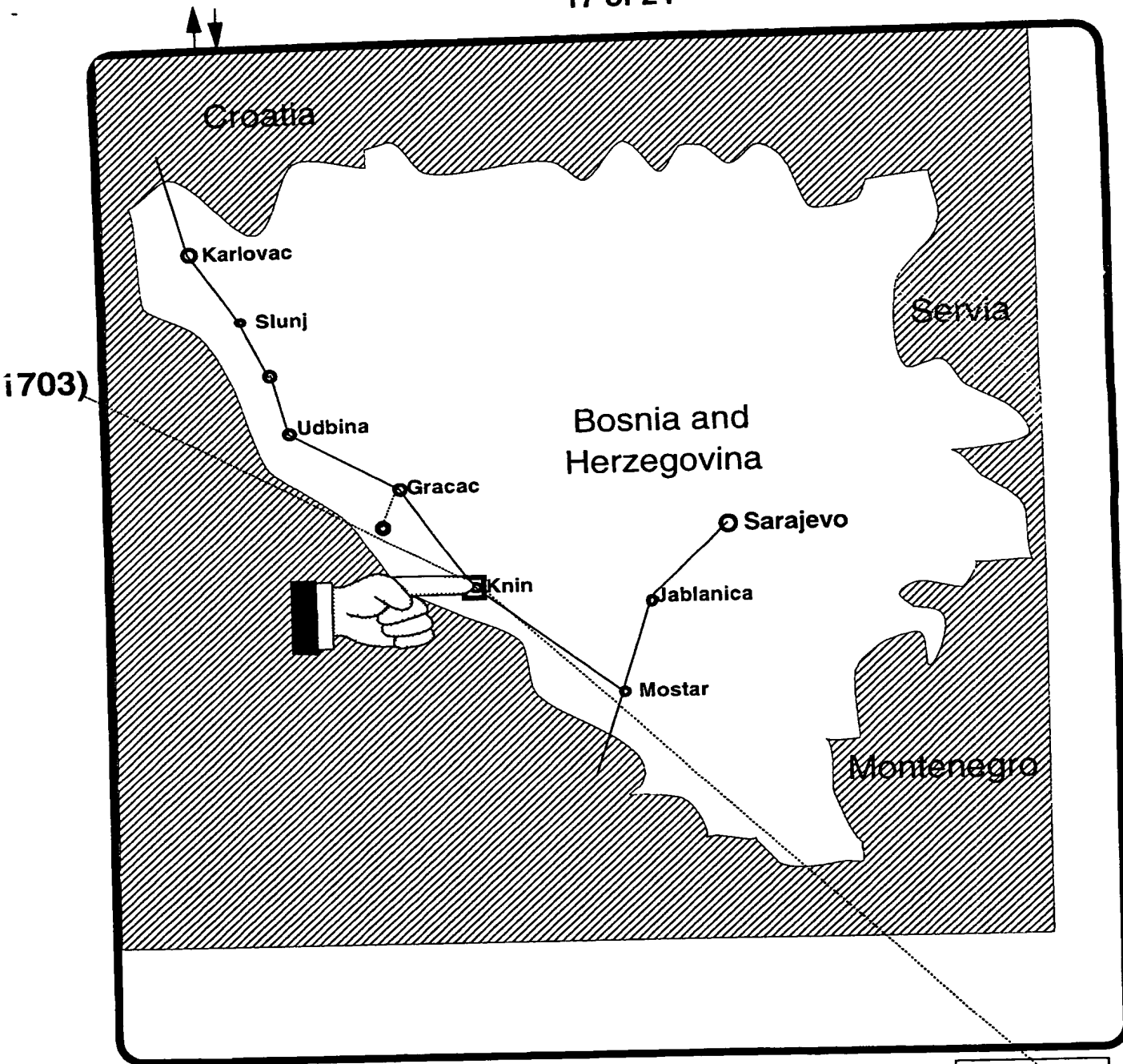
### Getting Around, Taking Precautions

If traveling from Zagreb via Karlovac and down through Knin you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the Hotel Bellevue and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include Slunj, Plitvice, Udbina, and Gracac. Between them is little or nothing.

from: "Travel Guide to the Balkans". Document: 387

F. Incertis

17 of 24



Bosnia and Hercegovina: C.I.A. 1994. (Call no. G6860 1994. U5 Case D) - 1/1,250,000

(1700)

(1701)

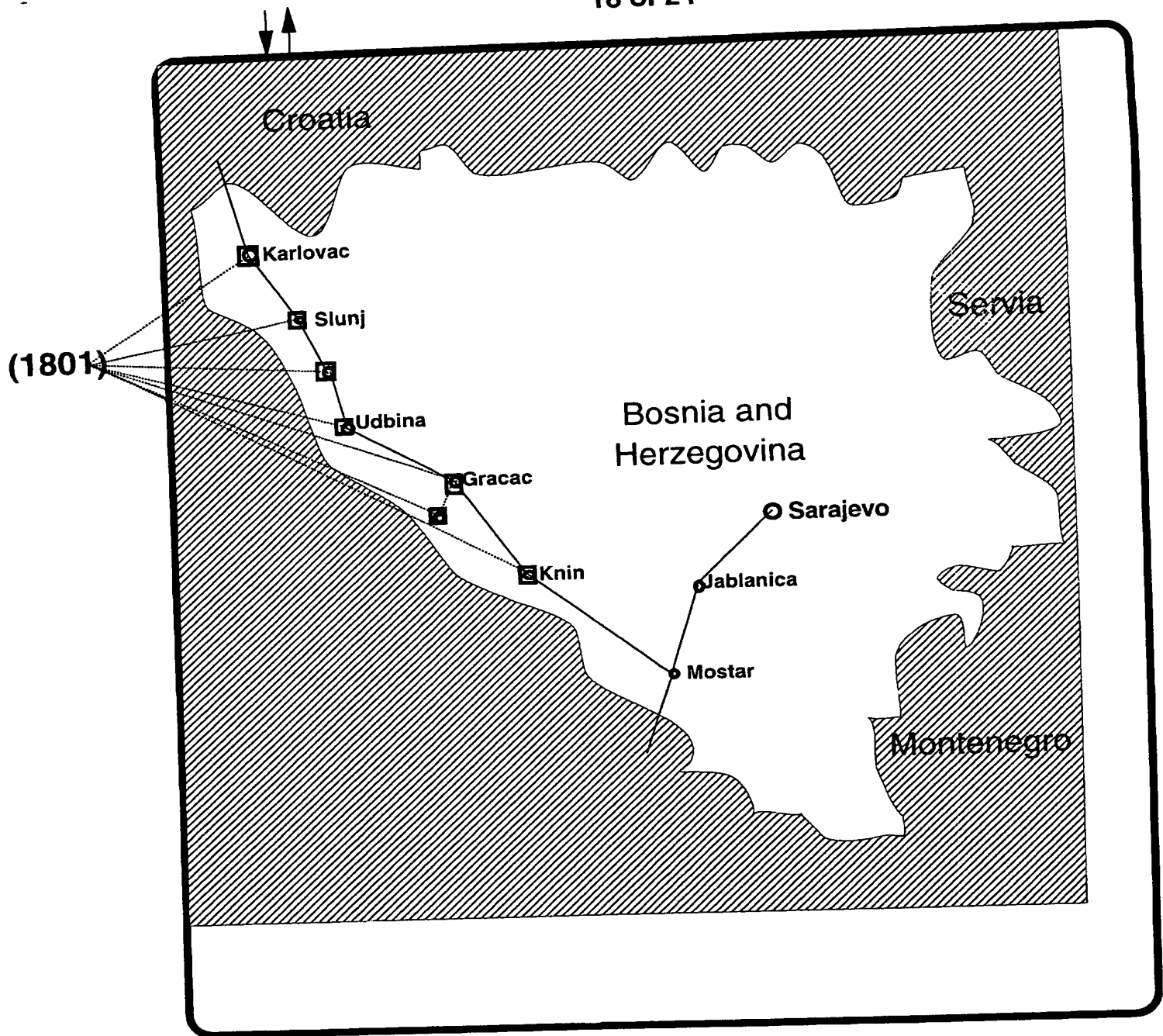
(1702)

**MAP CALIBRATION**

Map scale: 1 / 1,250,000

Press the touch-foil over a place on the map:

Zagrev	Karlovac	Knin	Hotel Bellevue
Slung	Plitvice	Udvina	Gracag

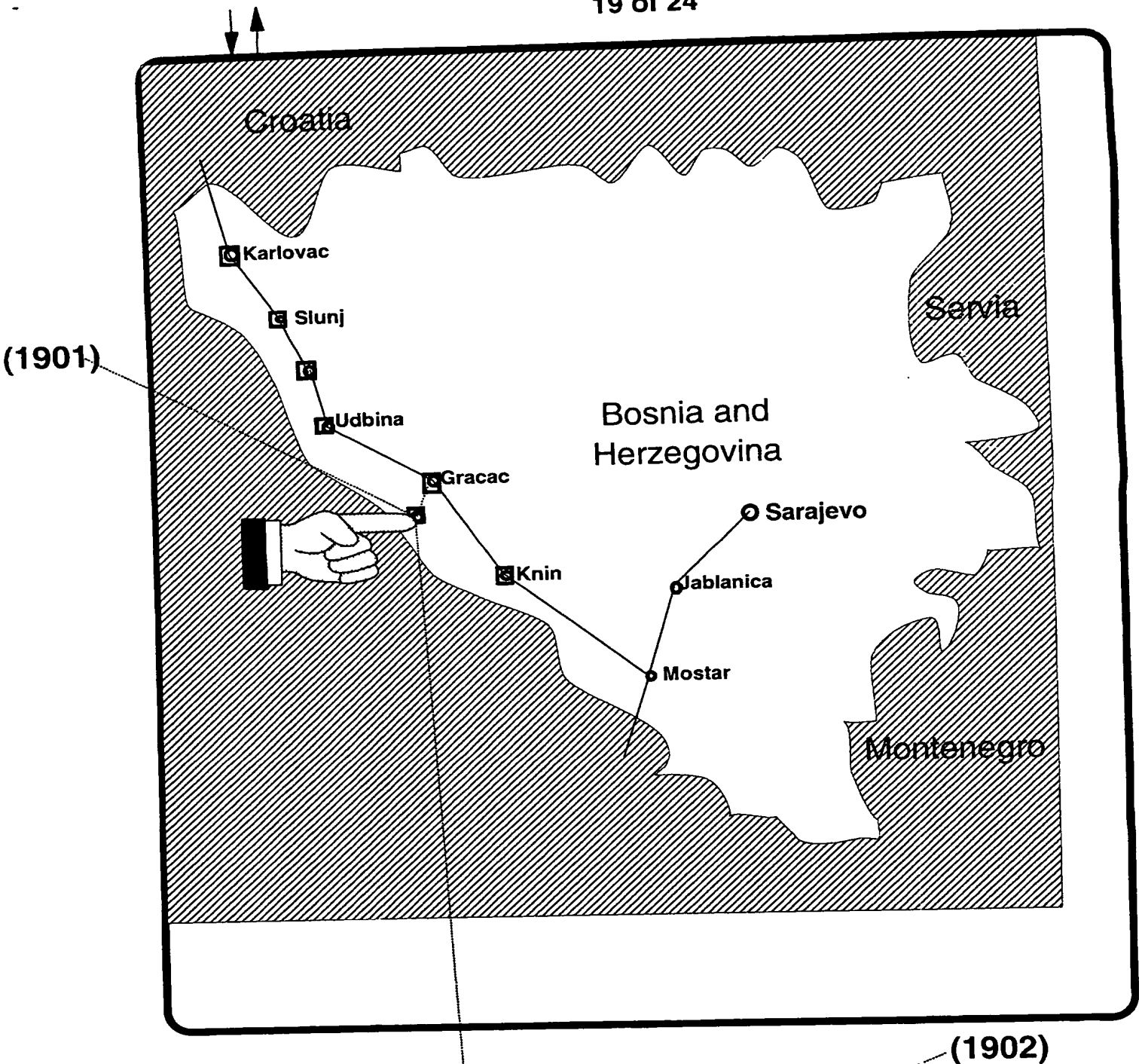
F. Incertis  
18 of 24

### Getting Around, Taking Precautions

If traveling from **Zagreb** via **Karlovac** and down through **Knin** you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the **Hotel Bellevue** and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include **Slunj**, **Plitvice**, **Udbina**, and **Gracac**. Between them is little or nothing.

F. Incertis

19 of 24



### Getting Around, Taking Precautions

If traveling from Zagreb via Karlovac and down through Knin you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of the park is the **Hotel Bellevue** and if you get in trouble on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include Slunj, Plitvice, Udbina, and Gracac. Between them is little or nothing.

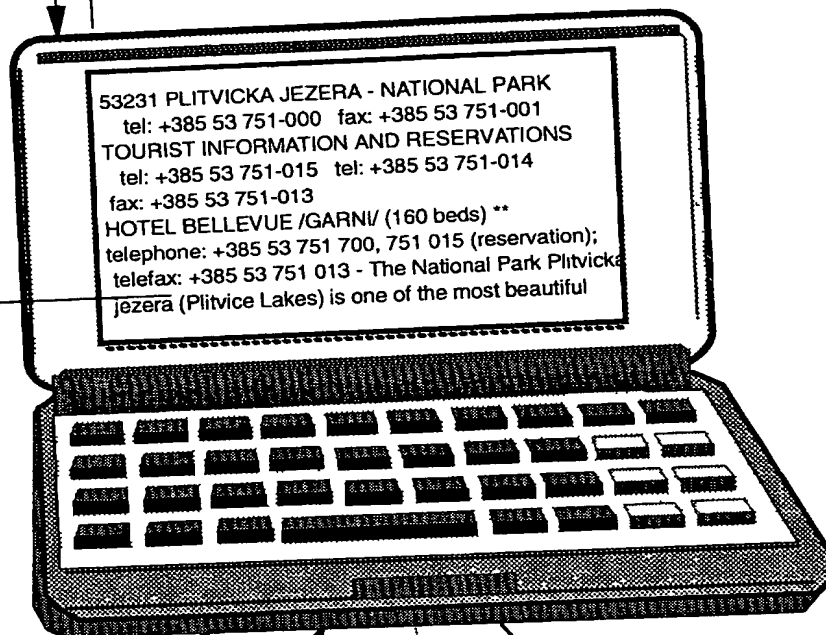
FR 9 2000 0039

F. Incertis

20 of 24

Internet

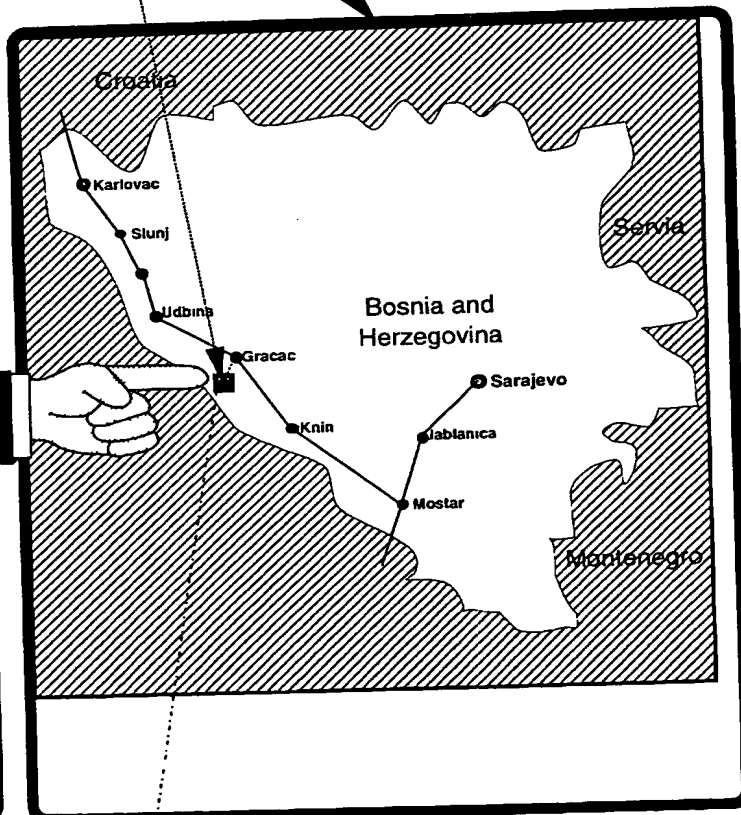
item retrieved  
information (2000)



### Getting Around, Taking Precautions

If traveling from **Zagreb** via **Karlovac** and down through **Knin** you will cross the region known as Lika. This is a mountainous stretch through which runs the length of the Mala Kapela hills. There is a lovely section of national park known as Plitvice Jezera. At the center of this region is **Hotel Bellevue** and if you get stuck on the road or run into inclement weather, it is a good place to hole up. It is, however, pricey. Primary villages along this route include **Slunj**, **Plitvice**, **Udbina**, and **Gracac**. Between them is little or nothing.

-171 -



item selected (2002)

item location (2001)



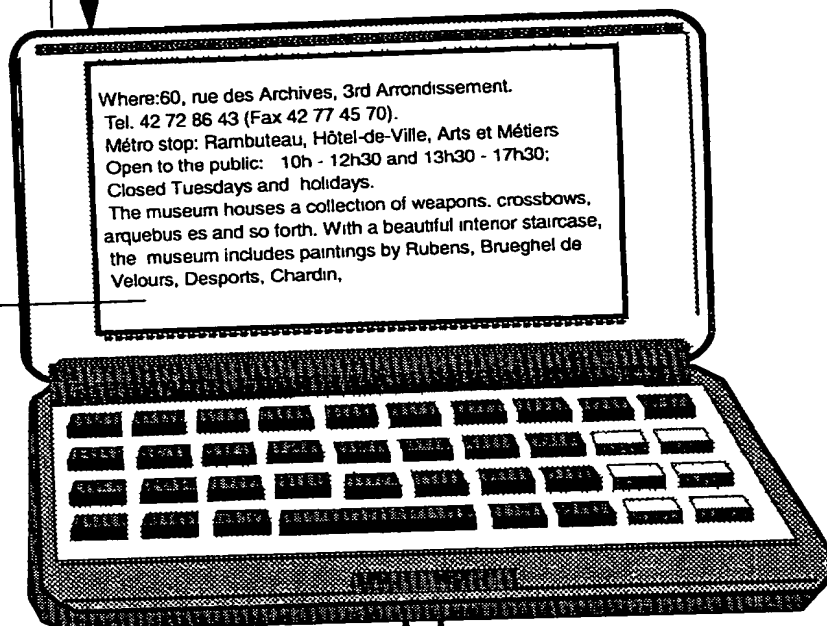
FR 9 2000 0039

F. Incertis

21 of 24

Internet

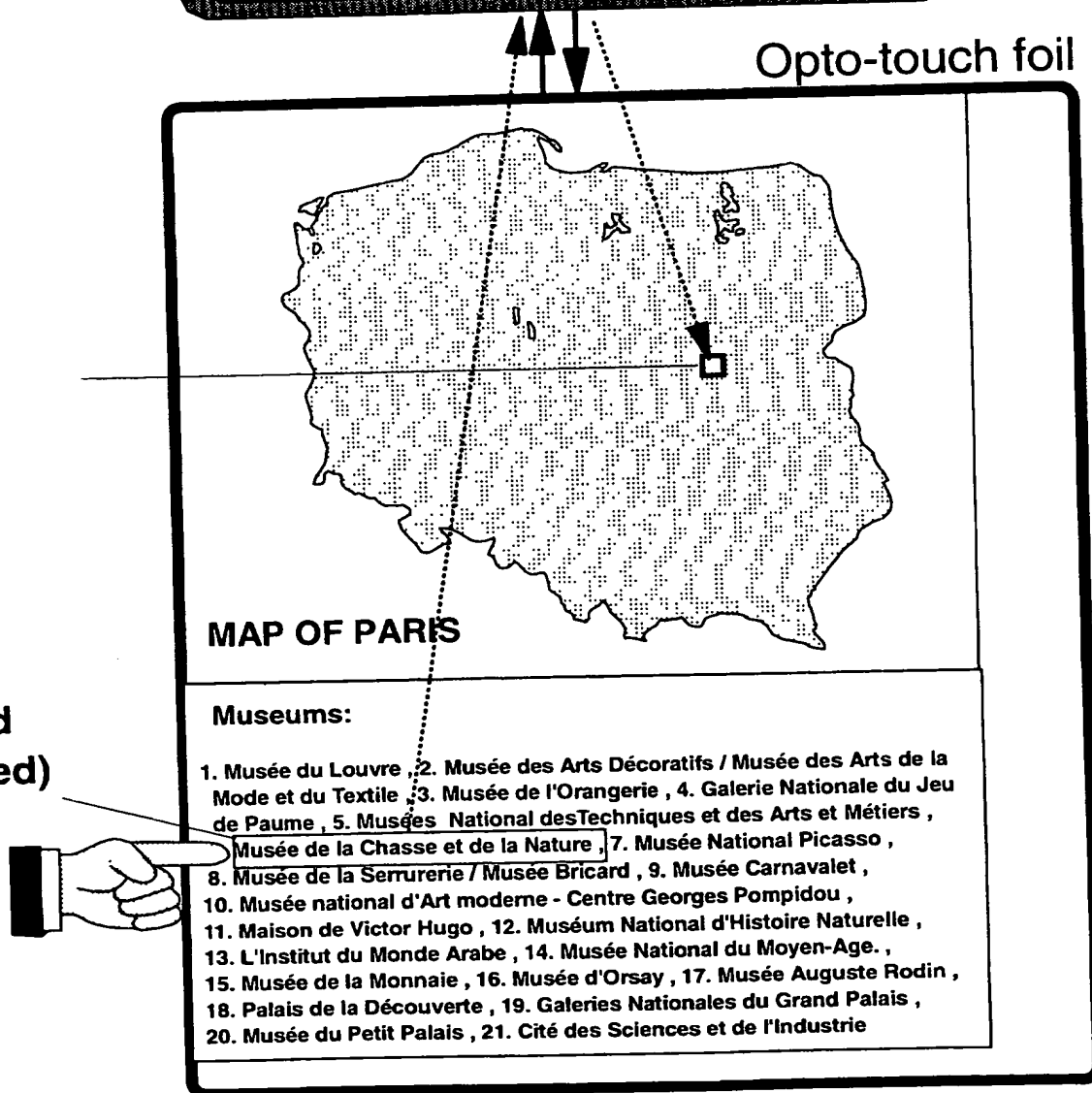
item retrieved  
information



Opto-touch foil

item location  
(light spot)

item selected  
(point pressed)



Internet

FR 9 2000 0039

F. Incertis

22 of 24

item retrieved  
information (2205)

Dancing depuis 1936  
- Lundi : relâche momentanée;  
- Mardi : relâche  
- Mercredi : zazou evening (Rock  
and roll, cha-cha, boogie-woogie)  
21 h 30 Entrée : 80 F  
- Jeudi - Vendredi - samedi :  
Disco, Latino de 23 h 30 à l'aube  
Entrée : 100 F  
- Dimanche matinée bal, dancing

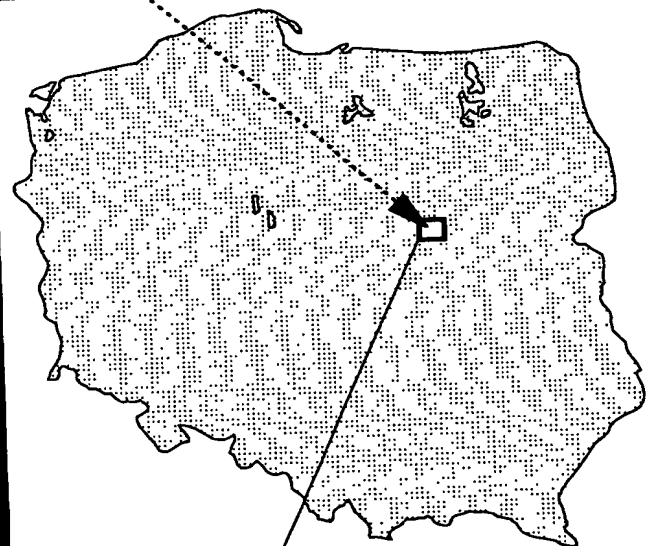
User workstation (2204)

Light emitting foil  
(2201)

Touch foil (2200)

Club 18 du Palais Royal	01 42 97 52 13	18 r Beaujolais 75001
D.J Café	01 40 26 31 92	87 r St Honoré 75001
La Parisienne télécopie:	01 47 03 38 87	11Bis r Ste Anne 75001
La Scala de Paris	01 42 61 64 00	188Bis r Rivoli 75001
Le Balisier	01 42 83 74 26	47 r Berger 75001
Le Prélude	01 42 60 31 60	1 r Richelieu 75001
Le Triangle	01 42 61 68 28	13 r Argenteuil 75001
Limelight Point Phone:	01 45 08 51 53	14 r St Denis 75001
Limelight	01 45 08 96 25	14 r St Denis 75001
L'Insolite Club	01 40 20 98 59	33 r Petits Champs 75001
Sagitario (Sté)	01 42 61 99 22	33 r Petits Champs 75001
Slow Club	01 42 33 84 30	130 r Rivoli 75001
Star Night	01 47 03 35 04	11Bis r Ste Anne 75001
Alvez Fernando	01 40 41 05 55	
	01 40 41 10 41	
	01 40 41 12 02	44 r Vivienne 75002
	01 42 60 40 51	21 r Daunou 75002
ican Dream		
Le Rex (Sté Théâtre)		
télécopie:	01 42 21 11 93	1 bd Poissonnière 75002
	01 42 36 83 98	discothèque
		5 bd Poissonnière 75002
Cristhom	01 40 26 01 50	25 bd Poissonnière 75002
Le Treize	01 40 28 13 69	13 r Dussoubs 75002
L'Entracte	01 40 26 60 31	25 bd Poissonnière 75002
Pub Opéra	01 47 03 62 11	21 r Daunou 75002
	-758-	

item selected (2202)



MAP OF PARIS (2206)

item location (2203)

Phone call

FR 9 2000 0039

F. Incertis

23 of 24

called phone number (2302)

01 40 41 05 55

-758-		
Club 18 du Palais Royal	01 42 97 52 13	18 r Beaujolais 75001
D.J Café	01 40 26 31 92	87 r St Honoré 75001
La Parisienne télécopie:	01 47 03 38 87	11 Bis r Ste Anne 75001
La Scala de Paris	01 42 61 64 00	188 Bis r Rivoli 75001
Le Balisier	01 42 33 74 26	47 r Berger 75001
Le Prélude	01 42 60 31 60	1 r Richelieu 75001
Le Triangle	01 42 61 68 28	13 r Argenteuil 75001
Limelight Point Phone:	01 45 08 51 53	14 r St Denis 75001
Limelight	01 45 08 96 25	14 r St Denis 75001
L'Insolite Club	01 40 20 98 59	33 r Petits Champs 75001
Sagitario (Sté)	01 42 61 99 22	33 r Petits Champs 75001
Slow Club	01 42 33 64 30	130 r Rivoli 75001
Star Night	01 47 03 35 04	11 Bis r Ste Anne 75001
Alvez Fernando	01 40 41 05 55	
	40 41 10 41	
	01 40 41 12 02	44 r Vivienne 75002
American Dream	42 60 40 51	21 r Daunou 75002
Cinéma Le Rex		
	01 42 21 11 93	1 bd Poissonnière 75002
	01 42 36 83 98	discothèque
		5 bd Poissonnière 75002
Cristhom	01 40 26 01 50	25 bd Poissonnière 75002
Le Treize	01 40 28 13 69	13 r Dussoubs 75002
L'Entracte	01 40 26 60 31	25 bd Poissonnière 75002
Pub Opéra	01 47 03 62 11	21 r Daunou 75002

item selected (2301)

Touch foil (2300)

FR 9 2000 0039

F. Incertis

24 of 24

Internet

item address (2404)

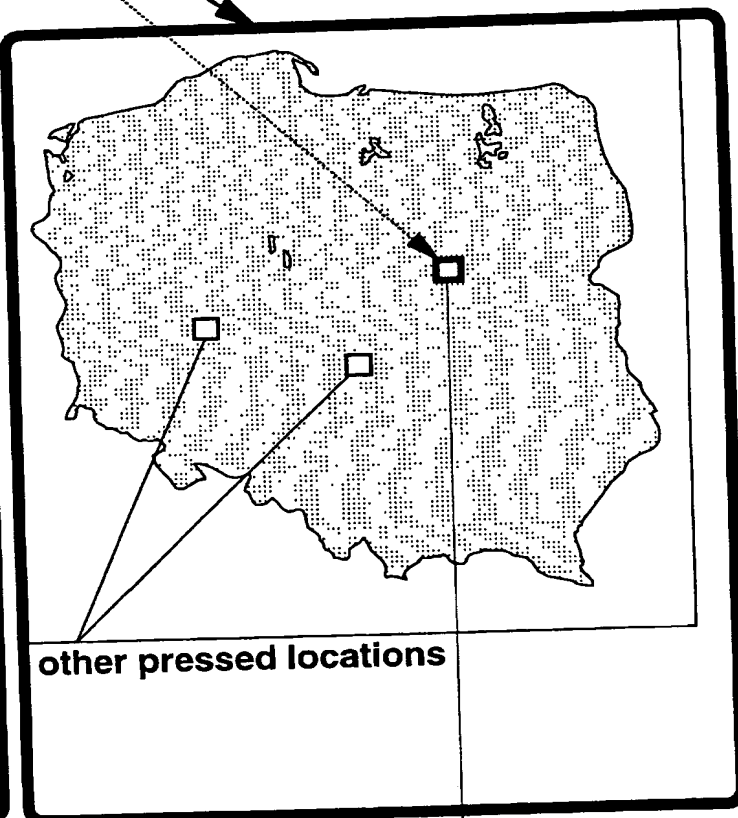
44 r Vivienne 75002

Touch foil (2400)

Opto foil (2402)

-758-		
Club 18 du Palais Royal	01 42 97 52 13	18 r Beaujolais 75001
D.J Café	01 40 26 31 92	87 r St Honoré 75001
La Parisienne télécopie:	01 47 03 38 87	11Bis r Ste Anne 75001
La Scala de Paris	01 42 61 64 00	188Bis r Rivoli 75001
Le Balisier	01 42 33 74 26	47 r Berger 75001
Le Prélude	01 42 60 31 60	1 r Richelieu 75001
Le Triangle	01 42 61 68 28	13 r Argenjeuil 75001
Limelight Point Phone:	01 45 08 51 53	14 r St Denis 75001
Limelight	01 45 08 96 25	14 r St Denis 75001
L'Insolite Club	01 40 20 98 59	33 r Petits Champs 75001
Sagitario (Sté)	01 42 61 99 22	33 r Petits Champs 75001
Slow Club	01 42 33 84 30	130 r Rivoli 75001
Star Night	01 47 03 35 04	11Bis r Ste Anne 75001
Alvez Fernando	01 40 41 05 55	
	01 40 41 10 41	
	01 40 41 12 02	44 r Vivienne 75002
American Dream	01 42 60 40 51	21 r Daunou 75002
Cinéma Le Rex (Sté Théâtre)		
télécopie:	01 42 21	Poissonnière 75002
	01 42	scothèque
		5 bd Poissonnière 75002
Cristhom	01 40 26	25 bd Poissonnière 75002
Le Treize	01 40 28	13 r Dussoubs 75002
L'Entracte	01 40 26 60 31	25 bd Poissonnière 75002
Pub Opéra	01 47 03 62 11	21 r Daunou 75002

item selected (2401)



selected item location (2403)